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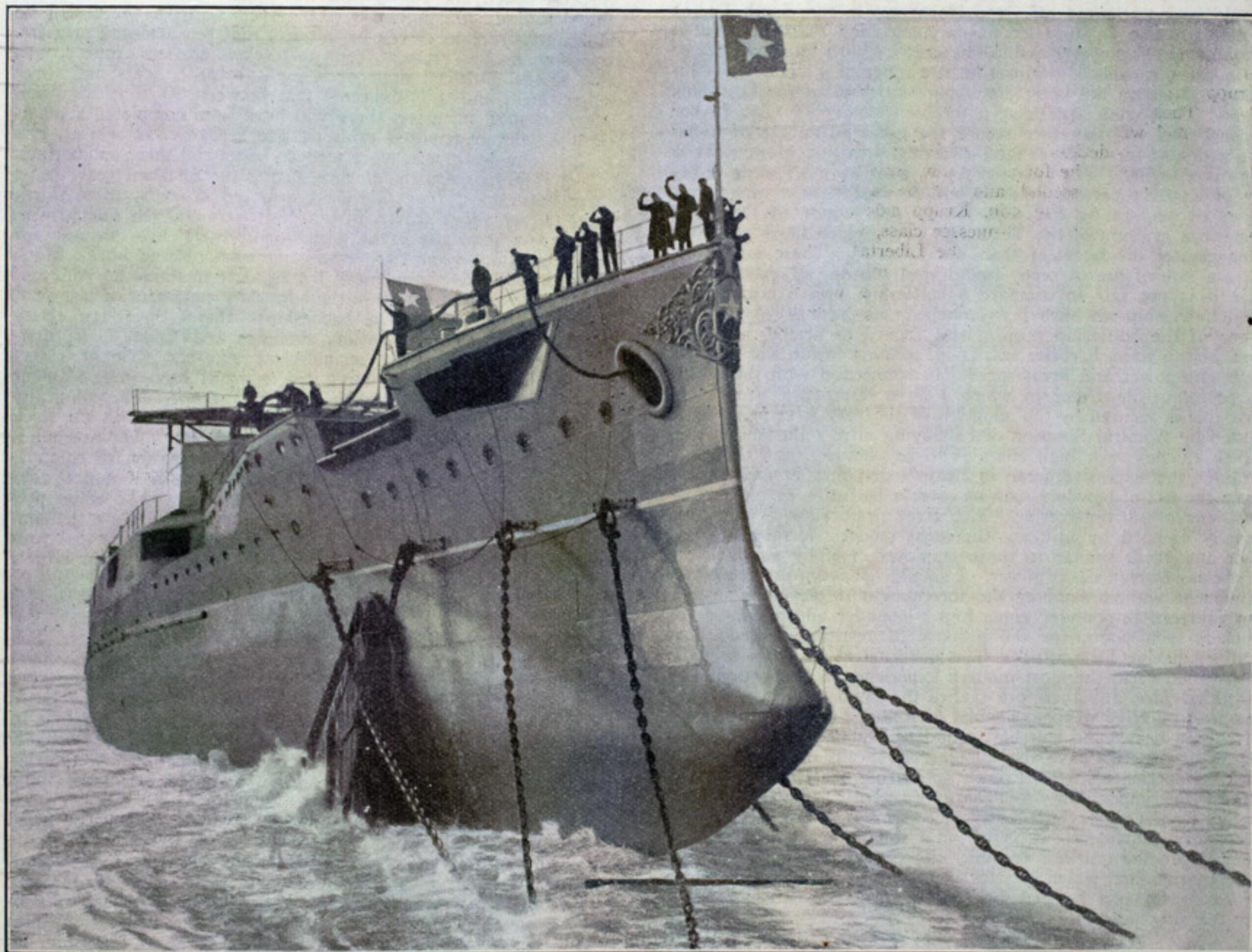
## CHILEAN BATTLESHIP LIBERTAD.

In the launch of the Chilean battleship Libertad at the works of Vickers, Sons & Maxim, Barrow, there is a lesson to be learned. The great vessel was launched nine months after the keel was laid and could have been launched seven months after. The contract which the ship building firm entered into was to complete her within eighteen months and this might easily have been done had not circumstances arisen which made it inexpedient for Chili to receive the ship at all. Chili, having patched up her differences with Argentina, found herself without need of the battleship. Notwithstanding the short time which had elapsed since laying the keel, the vessel was in a more advanced stage than warships usually are when they are launched. She

1,000 tons. Thus, in a minute the Chilean ship may fire from her primary guns:

		Foot-tons in energy.
12 projectiles of 500 lbs. =	6,000 lbs. and	335,568
98 projectiles of 200 lbs. =	19,600 lbs. and	1,186,584
110	25,600	1,522,152

From each broadside there can be fired per minute twelve projectiles of 500 lbs. and forty-nine of 200 lbs., a total of 15,800 lbs., with an aggregate energy of about 928,800 foot-tons. Each 500 lbs. capped shot could perforate at half a mile range the broadside armor of any ship afloat; while the 200 lbs. could perforate 6-in. armor at 1,000 yards range. When chasing the enemy the ship can fire ahead each minute six projectiles of 500



Launch of the Chilean Battleship Libertad.

[Building by Vickers, Sons & Maxim, Barrow, England.]

was launched with all her armor on, her batteries were erected ready for receiving the guns and most of the casements were on board. The total launching weight was 6,800 tons and the time from starting to flotation was 45 seconds.

The Libertad is the most powerfully-armed battleship for her size yet built. Only one or two immense and costly ships excel her. The weight of projectiles from the whole of the ship's armament in one single round equals 5,846 lbs., or 426 lbs. for each 1,000 tons displacement of the ship, while including only the primary guns the weight equals 407 lbs. per 1,000 tons, and this can be said only of the new battleships of one other power. The round from primary guns in the latest French ships is 306 lbs. and of Russian and German ships 290 lbs. per

lbs., and fifty-six of 200 lbs.; in all 14,200 lbs., with a collective energy of about 845,900 foot-tons. This ship has also an immense gun power against torpedo or submarine boat attack. Her smaller guns fire per minute 280 projectiles of 14 lbs., 112 of 6 lbs., 1,200 of 1 lb. (pom-poms), and 2,000 rifle bullets, so that the enemy, once discovered, would have little chance of escape. The defensive qualities of the ship are equally satisfactory. Armor manufactured at the Sheffield works of the company, according to the latest process, forms a citadel in the center of the ship, and within this area are ten of the 7.5-in. guns. In addition to the 7-in. armor separating the guns, so as to localize the damage from such shot as may find its way into the ship. The main armor extends for the full length of the ship



on the water line, being reduced to 3 in. near the ends. Four of the 7.5-in. guns are in casemates of 7-in. armor on the upper deck, and the 10-in. guns are in 10-in. armored barbets at the forward and aft ends of the ship. The smaller guns, while sheltered, are in positions to command the enemy from all points. In action, the ship and all the guns may be controlled from a conning tower built of 11-in. armor. Although these splendid fighting qualities have had to be provided upon limited dimensions—the length being 436 ft., the beam 71 ft. and the draught only 24 ft. 7½ in., with a displacement of 11,800 tons—a sea speed of 19 knots is to be realized. The two engines driving separate propellers will develop collectively 12,500 I. H. P. Nor have the high speed and fighting power been attained at the sacrifice of radius of action, as the ship carries fuel and supplies to enable it to steam at 10 knots for 12,000 sea miles.

Concerning the ship *Lieut. Dawson*, one of the directors of Vickers, Sons & Maxim, said:

"I would like to refer to some of the salient features in the design of this ship, and especially to the artillery, which has been selected with so much of experience and discrimination by the naval authorities of the republic of Chili to meet the naval requirements, having regard to the special strategic position that the country holds amongst the other American nations. This selection is due to a large extent to the very able advice given to the government by the present commission, who have realized the importance of combining a high gun-power with special armor protection and great speed in a ship of moderate draught, capable of operating in shallow waters, and yet with particular properties to insure a steady gun platform in heavy seas such as would be experienced off Cape Horn and in the South Pacific generally. She is, for her displacement, the most-powerfully-armed ship afloat. Her main armament includes four high-power 10-in. guns, capable of perforating at a range of 3 miles the 11-in. Krupp plates on the latest American battleship of the *Louisiana* class. These guns will have a muzzle velocity of 2,840 ft. per second, and will therefore secure the great advantage of a flat trajectory at moderate ranges, ensuring precision along with a high rate of fire. The fourteen 7.5-in. guns have a muzzle velocity of 2,958 ft. per second, and will be capable at a range of 4 miles of perforating the 5-in. Krupp side armor of the latest American cruisers of the *Tennessee* class, which have 2,000 odd tons greater displacement than the *Libertad*. These guns, too, have a rate of fire of seven rounds per minute. It may be said that it is not fair to compare a battleship with a cruiser, but whilst the ship we have just launched will have all the advantages of the battleship proper with regard to armor, having a 7-in. belt, a 10-in. barbet and 11-in. conning tower, she has also high gun-power and great speed. In connection with the ability to perforate the armor to which I have referred, I should say that this is secured by the adoption of the very wise policy suggested by Admiral Simpson of employing nitro-cellulose powder, which enables such high energies to be obtained, and that, too, without the excessive wear in heavy guns that is unavoidable from the use of powders such as cordite, ballistite, or other compositions of nitro-glycerine. The great perforation is also materially assisted by utilizing the most modern form of capped shot and shell, similar to those employed now by nearly every first-class foreign naval power. I should not leave the subject of armament without noticing the forethought displayed in installing fourteen 14-pounder guns, four 6-pounder and a number of Vickers' pom-poms, for the purpose of resisting torpedo boat and submarine boat attack. The government of Chili may be said to have had the most modern experience in connection with naval warfare, and therefore realize the importance of adopting the most effective weapons against such attack by the employment of such a heavy and suitable secondary armament. The United States of America have also adopted the means of combating attack. Experience in the French submarine boat maneuvers has shown the impossibility of guarding against submarine attack except by the most vigilant look-out and the use of the heaviest secondary armament. It is of vital importance to be able to concentrate the quickest possible rate of fire on any portion of a submarine boat which may be seen, because such period of time of exposure must be very brief. Accuracy as well as rapidity are the only safeguards."

#### PACIFIC MAIL BUYS TWO STEAMERS.

The steamships *Minnelora* and *Minnuahta*, which the New York Ship Building Co., Camden, N. J., is constructing for the Atlantic Transport Line have been sold to the Pacific Mail Steamship Co. of San Francisco. These steamships, among the largest ever constructed in the United States, were ordered by the Atlantic Transport Line about two years ago. Since that time, of course, the Atlantic Transport Line has been taken into the Morgan shipping combination, officially known as the International Mercantile Marine Co. The ships are yet on the stocks but it is expected that one will be launched in June and the other in August. Both are to be completed as speedily as possible. The Pacific Mail Steamship Co. has been on the lookout for vessels for some time past, as there is at present considerable rivalry for first-class tonnage on the Pacific. The vessels will ply between San Francisco and the orient. Nothing is known regarding the price paid for them but it is undoubtedly an advance over the contract figure.

#### BIG NAVAL PLANS.

Details of British Program—Many Unemployed Workmen in Scotch and English Ship Building Districts—Considering Question of Light Load Line.

Glasgow, Mar. 16.—Your readers will be interested in more of the details of the naval program, just submitted to parliament, than were given in the cable dispatches to newspapers. The program calls for an increase of £3,202,000 in the naval vote of the year, and provides for building no fewer than forty-three warships of all kinds, from battleships to shallow draft gunboats. With the single exception of one cruiser, the whole of the new work is to be given out on contract. The repair work is also to be distributed as much as possible among the private firms which do the building. All the money voted for the year 1902-3 will have been earned and spent by the end of this month. The amount proposed in the estimates for 1903-4 for new construction is £10,137,000, of which £1,150,000 will be devoted to the commencement of new ships. Since the last statement was presented to parliament the board has considered carefully the report of the committee on the past arrears in ship building. They believe that the light shed on the subject by that report has been of much value, and they have accordingly taken every opportunity of profiting by its recommendations. Between April 1, 1902, and Mar. 31, 1903, inclusive, the following ships will have been completed and passed into the fleet reserves: Battleships—*London*, *Venerable*, *Russell* and *Montagu*; the first-class armored cruisers *Bacchante*, *Good Hope*, *Drake*, *Leviathan* and *King Alfred*; the sloops *Odin* and *Merlin*; also four destroyers, three torpedo boats, six submarines, the repair ship *Assistance* and the distilling ship *Aquarius*. On April 1, 1903, there will be under construction eleven battleships, nineteen armored cruisers, two second-class cruisers, four third-class cruisers, four scouts, two sloops, nineteen destroyers, eight torpedo boats and three submarines; and it is expected that between April 1, 1903, and Mar. 31, 1904, inclusive, there will have been completed six battleships, eleven armored cruisers, one second-class cruiser, two sloops, four destroyers, eight torpedo boats and three submarines.

It is proposed to commence during the financial year 1903-4 three battleships, four first-class armored cruisers, three third-class cruisers, four scouts, fifteen destroyers and ten submarines; also a new admiralty yacht, a shallow-draught river steamer for the China station and two vessels for naval reserve work. Much progress will have been made by Mar. 31 next in the policy of reconstruction, announced in the admiralty statement of last year, namely, completion of the battleships (*Royal Sovereign* class) *Empress of India*, *Resolution*, *Revenge* and *Royal Oak*; first-class cruiser *Powerful*; second-class cruisers (*Talbot* class) *Doris*, *Venus*, *Dido* and *Isis*; and in hand battleships *Balfleur* and *Centurion* and first-class cruiser *Terrible*. The admiralty note says: "Owing to the great pressure of work in the dock yards it has been decided to allow the contractors who are building the ships to complete them in all respects ready for commission, by which means all the ship building firms which construct war vessels will gain further experience and be better prepared to undertake naval work. The policy of relieving the congestion of repairs in the dock yards by sending ships to be repaired by the private firms which built them has been largely followed and the board propose to continue the policy."

#### MERCHANT CRUISERS—BOILER QUESTION.

On the subject of subsidized merchant cruisers Lord Selborne, first lord of the admiralty, says: "Subsidized merchant cruisers can never be a substitute for his majesty's cruisers, but they will have their special uses. It did not seem to the board right that any ship should be in existence which, in the case of war, no ship at the disposal of the admiralty could not reasonably expect to catch, and they were accordingly glad when, for this reason among others, his majesty's government decided, should parliament approve, to give such a subsidy to the Cunard company as will enable them to build two steamers of superior speed to anything afloat, which will be entirely at the disposal of the admiralty in time of war. This, in the opinion of the board, was definitely the most economical method of effectually meeting a special need before the current agreement in respect of subsidized merchant cruisers with the various steamship companies expires two years hence. The board will have to reconsider its policy in respect of ships of no special speed in the light of the reports of the two committees already mentioned."

Lord Selborne of course refers to the vexed boiler question, and his remarks deserve repeating. "I have never attempted," he says, "to minimize the difficulties which have been caused to the fleet by the adoption of Belleville boilers. These difficulties were due partly to the faulty manufacture of the first series of such boilers, partly to the great increase of pressure, and partly to the initial want of training of the personnel in their management, but they were mainly *ejusdem generis* with those which the navy had for years to contend with on the first adoption of the various kinds of boilers which preceded them. As each of the earlier Belleville-boiler ships comes in for refit on the termination of her commission, she is being placed in thorough repair and made absolutely efficient for service. Owing to the experience gained no further difficulties ought to occur with these ships, and although the board agrees with the boiler committee in considering other types of water-tube boilers to be



much preferable, they also share the committee's view that to replace these boilers by others in the ships which already have them would be unjustifiable because an unnecessary expense." He enforces the point that the water-tube boiler confers advantages by stating that the new Duke of Edinburgh class of cruiser could not have had such gun power as she possesses on the displacement had such boilers not been adopted.

There is some disappointment that Greenock has not been chosen as the site of the naval base, but it has been decided to form it on the Forth in order to command the North sea. The locality chosen for the new naval harbor, and probably dock yard, is on the north side of the Firth of Forth and above the famous Forth bridge. At present it is an open bay, and a favorite place of shelter for coasters in stormy weather. To make the base more effective for coast defence, there will eventually have to be a ship canal between the Forth and the Clyde, say from Grangemouth harbor in the former to about the locality of John Brown & Co.'s works at Clydebank on the Clyde. The distance is only some 30 miles and such a canal should be constructed to enable heavy war ships to pass rapidly from coast to coast, and between the two great estuaries of Scotland, as required. There is at present a canal between the Forth and the Clyde, but it is only adapted for barge traffic. This naval base or depot will be the fourth in the United Kingdom. The land will be acquired shortly.

#### HIGHER PRICES FOR SHIP MATERIAL—UNEMPLOYED MEN.

Ship building circles have been again depressed by a further advance in steel plates, for which Scotch makers are now asking £5:17:6 per ton less 5 per cent. This is in consequence of the advance in pig iron, said to have been generated, or at all events accelerated, from your side. But warrants are now easier than they were and as far as Scotch smelters are concerned they are getting their furnace fuel this month a shilling per ton cheaper, which means a good profit to them. The rise in ship building material just now is very disappointing, because it is checking new business at a time when it is very much needed. This district is running over with unemployed ship yard workers, who have migrated here from less well employed districts, just at a time when our own unemployed were increasing in number. To relieve the distress the corporation of the city are offering to take on extra hands in all the labor-employing departments of the municipality. Some ship building contracts have certainly been booked of late, but whether buyers or builders are taking the risk of the market one cannot tell. The Allan Line has placed orders for two boats, about the size of the Bavarian, for the Canadian trade. One is to be built by Alexander Stephen & Sons, Glasgow, and the other by Workman, Clark & Co., Belfast.

#### NEW CANADIAN LINES.

Fourteen steamers purchased by the Canadian Pacific Railway Co. from the Elder-Dempster Co. include the Lake Champlain, Lake Erie, Lake Manitoba and Lake Michigan of the Beaver Line; Montreal and Montezuma of the British & African Line; Milwaukee, Montcalm, Montegale, Monterey, Montfort, Mount Royal and Mount Temple of the Elder-Dempster Line, and Montrose of the West India Line. The specifications have not yet been issued of the three or four new boats to be built, but it is announced that the Canadian Pacific has decided to put on a new regular service of steamers between Glasgow and Montreal in summer and to St. John in winter. The service will begin with the opening of navigation next month, will be in charge of the company's local agent and will be carried on by steamers belonging to the Beaver Line fleet, lately purchased by the company.

The Canadian government's new proposals for a fast Atlantic steamship service are attracting great attention. The Allan Line, the Leyland Line and the Canadian Pacific will be the principal bidders. Some think that the Canadian Pacific will secure the subsidy as an offset to the government aid to be given the Grand Trunk in its transcontinental enterprise, but the Allans will be bad to beat.

#### CONSIDERING QUESTION OF LIGHT LOAD LINE.

The select committee of the house of lords recently appointed to consider and report on the subject of the light load line has commenced its sittings. Earl Spencer is president and the committee includes Viscount Ridley, Lord Muskerry, Lord Wolverton, Lord Brassey, Lord Inverclyde and Lord Shand. The terms of the reference are: To inquire and report (1) whether, and, if so, to what extent, British ships are sent to sea in an unseaworthy condition by reason of their being insufficiently or improperly ballasted. (2) Whether any amendment or amplification of the present law is desirable in connection therewith. (3) And, if so, to what extent any such alteration of the law could be made equally applicable to foreign vessels. One of the first witnesses called was Mr. Moore, assistant secretary of the Merchant Service Guild. He said the guild was a body of captains and officers of the merchant service, approaching 10,000 in number. The opinion of the guild in regard to this matter of the load line was that a large proportion of ships in ballast were unseaworthy by reason of their being insufficiently laden, or without enough ballast to give them

sufficient immersion and make them manageable under any conditions of bad or exceptionable weather. The members of the guild said they would rather proceed to sea with vessels overladen than with vessels underladen, because the overladen ship was usually manageable, while the underladen ship in bad weather was absolutely unmanageable and exceedingly dangerous to life at sea. In the last three years there were fifteen cases of accident due to insufficient and improper ballasting, and the guild thought it was unfair that they should have to wait until a far greater loss of life took place before adopting a measure such as that desired by the guild. Several cases of stranding had occurred owing to insufficient ballasting, but fortunately without loss of life. In the house of commons, Sir William Allan was informed by the president of the board of trade that in 1900 seven British sailing vessels had left foreign ports in ballast and had not since been heard of. The aggregate tonnage was 12,434 tons, and the number of officers and men carried was approximately 188. The guild did not say that the loss of those ships was due to insufficient ballasting, but the number was significant. It has been urged that the light load line was not necessary for short voyages, but the guild thought it was far more necessary on short voyages than on long voyages because the ships were constantly near the coast and experienced as rough weather as they might do on long voyages. The light load line was equally necessary with vessels in tow. It was a very small proportion of the masters who had discretionary power in the matter of ballasting, as the amount was usually fixed by the owners, or the superintendent. The guild wished to have the question of ballasting fixed by the state. The board of trade, under the merchant shipping act, had the power to detain insufficiently ballasted ships on the score of being unseaworthy, but, so far as the guild knew, it had not been exercised in regard to an insufficiently-ballasted ship. Mr. Moore thought the responsibility placed on a board of trade surveyor was unfair, as the fixing of a light load line should be carried out after the careful deliberation of the highest professional experts. The guild did not anticipate any bad result from making a restriction applicable to foreign ships. It had been argued that, owing to improvements on merchant ships, the light load line was unnecessary, but the guild state that adequate provision was not made even now in regard to sufficient water ballast.

#### FLOATING DOCK FOR PHILIPPINES.

Washington, D. C., March 25.—No decision has as yet been reached by the bureau of yards and docks, navy department, as to the lowest proposal for the construction of a steel floating dock for the United States naval station at Cavite, Philippine islands. The bids were opened on the 14th inst., but the award will not be made before the coming week. The advertisement for the bids contained these items:

Item 1. Price for dock and appurtenances delivered and moored at Cavite, ready for operation, and the time required for such delivery.

Item 2. Price for dock, moorings and appurtenances delivered at the works of the contractor ready for towing and insured by the contractor for delivery at Cavite.

Item 3. Price for the dock, moorings and appurtenances delivered at the works of the contractor ready for towing and without insurance.

Item 4. Price for towing the dock from the works of the contractor and delivering and mooring at Cavite.

Item 5. In case the bids on any of the above items exceed the appropriation available, an opportunity is given under this item to submit alternate proposals for completing the work within the appropriation.

The appropriation available for the work is \$1,225,000. Each bidder submitted plans of construction with his bid and the navy department is now considering the practicability of the several plans submitted. The bidders were:

United States Ship Building Co., Camden, N. J.—Item 1, \$1,443,000, time twenty-seven months; item 3, \$1,184,000, delivered at Wilmington, Del., time twenty months; item 3a, \$1,220,000, delivered at San Francisco, Cal; item 5, alternate proposal, \$1,110,000, according to plans and specifications, shipped to Cavite on lighters belonging to the government, time twenty months.

Maryland Steel Co., Sparrows Point, Md.—Item 3, \$1,085,000, delivered near Sandy Point, Md., with dock in three sections and 452 ft. over all; item 3a, in accordance with general descriptions, delivered at point of anchorage, etc., \$1,164,000, \$1,124,000 and \$1,215,000.

Chauncey L. Dutton, Yonkers, N. Y.—Item 3, \$1,105,000, delivered at an Atlantic seaport, time twenty-one months after completion of drawings; item 5, alternate proposal for dock of 30 ft. draught, 500 ft. long and 100 ft. clear width, \$910,000 additional; item 5a, to install said dock for the further sum of \$310,000; item 5b, to test dock before towing to Cavite at a site selected on the Atlantic seaboard, \$310,000 additional; item 5c, to test dock before towing to Cavite and installing same and delivered to the United States in perfect condition, \$170,000 additional; time for fulfilling these items, nine months; for installing dock at a site after receiving same from department, six months time.

A. A. E.



### MANCHESTER SHIP-CANAL.

At a time when the subject of canals is of active interest in this country, because of the ratification of the Panama canal treaty, especial attention is attracted to the Manchester ship-canal, which it was at first thought would prove a failure but which has shown a growth of 400 per cent. in the past eight years. It is understood that the International Mercantile Marine Co. has decided to add to its Manchester service and will supplement the Lamport and Holt, now plying between New York and Manchester, with other steamships which will ply between Boston and Manchester. Twelve years ago Manchester suffered from a lack of communication with the outside world. Manchester is a great manufacturing town. It fact it is a succession of closely packed towns, cemented visually with an endless succession of chimneys belching smoke. It is, however, thirty-two miles from Liverpool and naturally it suffered the handicap of extra handling of freight. The project to construct the Manchester canal was fought by Liverpool bitterly and it was only after years of effort that the bill was passed. The entire cost of the canal was \$75,000,000.

The construction of the canal was not long ago looked upon as impossible. Railroads had to be diverted and carried across the route on bridges of such height that ships might pass beneath. Canals that crossed its path had to be turned away or purchased outright, and in one case a small barge canal was carried over the ship-canal by means of a turn bridge made in the form of a great, elongated tub, which can carry a canalboat, horse, crew and all as it swings around. There are locks at either end, to prevent the water escaping, and then, when a ship has passed and the bridge swings into place again, the locks are opened, and the canal boat that has been imprisoned can go on its way. This piece of engineering is called the Barton aqueduct. It is 235 ft. long, 18 ft. wide, 6 ft. deep, and weighs on the swing 1,400 tons.

Because of minimum depth of 26 ft. the Manchester ship-canal permits ocean-going ships of this draught to enter its locks at Eastham, on the south shore of the Mersey, about 7 miles from the central wharves of Liverpool. After following the shore of the Mersey to Rucorn it then strikes out for some distance in a straight line in the direction of Manchester. Further along the canal follows the bottom of the Mersey and Irwill rivers, and at its terminus the wharves in Manchester are grouped alongside of two arms of an artificial lake. Here the land has been laid out to accommodate the greatest amount of freight with least amount of handling. There are eight wharves, ranging in length from 560 to 1,350 ft. and in width from 120 to 250 ft. A mammoth new wharf is now being built which will be 2,700 ft. long and 250 ft. wide, and which will enable ten ships the size of the steamships New York to unload at once alongside. The largest locks are 600 ft. long, so that any ship not exceeding this length, and thus including the majority of Atlantic liners, is able to use the Manchester canal. It is estimated that if the canal was utilized to its fullest capacity it could care for 145,000,000 tons of cargo in 300 working days of the year. This is double that at present handled on the wharves of Liverpool.

The canal company purchased an estate of 2,500 acres on the banks and at the terminal of the canal, which is now being sold, a parcel at a time, as sites for manufacturing plants. Much land has already been bought by large American concerns, and there has been built the British Westinghouse plant occupying several acres of land. Within immediate access of the docks are oil tanks, cattle yards and auction rooms, a grain elevator of American make, cold air storehouses for frozen meat, huge warehouses for storing cotton and other bulky commodities, dry docks, oil tanks, and canal pontoons to accommodate every character of cargo. The different parts of wharfage property are connected by a railroad system 40 miles in extent, so that freight may be unloaded direct from the ship into cars for interior points. Consignments which are to be sent to other sea coast towns are unloaded directly into coastwise steamships moored alongside. The facilities for dispatching traffic to all parts of England from the docks direct by rail give Manchester great advantages. Not only is there a considerable monetary saving, but the handling of the cargo is reduced to a minimum by being loaded direct from ship to railway truck when destined for interior towns. Fresh meat and perishables especially are kept in better condition by being dispatched direct from the docks by rail instead of having to be carried from ship to railway station, as is the case at Liverpool.

It thus costs much less to ship goods to the Manchester manufacturing district by way of Manchester than Liverpool. For example, cotton consigned to Manchester by way of the canal costs for terminal charges 6 shillings 3 pence a ton, while by Liverpool the cost would be 12 shillings 8 pence. For cotton consigned to Oldham the canal route would cost 9 shillings 6 pence, while the Liverpool route would have cost 14 shillings 8 pence. On one ship carrying a miscellaneous cargo from New York to various towns and cities of the United Kingdom, it was estimated that the canal cost \$6,769 less than Liverpool charges would have amounted to. This ship was the Vienna, which reached Manchester from New York Aug. 28, with a cargo of 5,877 tons. The steamship Manchester Corporation from New Orleans, with 5,916 tons cotton and large quantities of grain

and lumber, showed a saving of \$6,893, or 5.19 cents per 100 lbs. the Manchester Port, with 6,258 tons general cargo and live stock from Montreal, \$7,229, or 5.19 cents per 100 lbs.

The Leyland Line, which was the first of the English lines purchased by Mr. Morgan, has established a new service between Manchester and Boston. If this is to some extent experimental, as far as Manchester is concerned, it is regarded as equally a test of the capacity of the New York New Haven & Hartford Rd. to handle a large export traffic at South Boston. The wharves at South Boston owned by the New England Rd. which is controlled by the New York, New Haven & Hartford, have in the past been used mainly as a station from which loaded trains were ferried on floats across the harbor to other terminals. All this is now changed. The South Boston wharves have been altered to accommodate the Manchester and other ocean steamers which load there, and the officials of the New York, New Haven & Hartford road are confident of developing a large traffic.

Since 1894, when the canal was opened, its traffic has increased from 925,659 tons to 3,418,059 tons. In only the last six months the traffic has shown half a million tons growth. The cotton industry, which won for this district a world-wide prestige, but which in the face of American competition declined to an alarming extent in the last quarter century, has been quickened and prospered. Whole villages of empty houses have been populated with incoming workmen. For the purpose of accommodating this growing commerce the canal company is now enlarging its docks and warehouses. The population of Manchester has grown from 700,000 to 820,000.

Although new steamship lines have been opened between Manchester and certain ports of Italy and Spain, and also between Manchester and Norwegian points, nevertheless it is to America that this English city looks for the bulk of its trade. John K. Bythell, the chairman of the board of directors of the ship canal company, for example, showed how greatly England has now come to depend upon American commerce, by saying in his last report: "Our revenue during the current year will largely depend upon whether the great transatlantic trade should assume large dimensions or not. The American railways have been blocked by an enormous interior traffic, and steamers have had to come away with vacant space, because the railways have been unable to bring the cargo down. I hope we will see a change in this unfortunate state of things. All our ports are now greatly dependent upon the American trade, as you (the directors) are aware."

The New York service is triangular, the ships going first to Rio Janeiro, where they unload cargoes of manufactured products from the factories and foundries of the Manchester district; then they take to New York loads of coffee and other tropical products, and returning carry mixed cargoes of hay, steel shafting, machinery, pig iron, copper, lead, steel, slate, lubricating oil, glucose, resin and lumber. The Boston line is handling a great amount of grain, while from Canadian ports the Manchester liners carry large numbers of cattle and sheep. In the summer time the ships use Montreal and Quebec as ports, instead of the winter harbors of Halifax and St. John. In addition to the line of steamers from the United States and Canada, lines of steamers are now trading regularly between Manchester and Australia, the Persian Gulf, Bombay, Syria, Egypt and all the principal ports of the continent of Europe.

There is a large consumption in Manchester of all kinds of produce, both food, materials for manufacture and manufactured articles, within a short carting distance of the Manchester docks. The port is not, however, dependent alone on that local traffic. It is a great distributing center. The district nearer to Manchester than to any other steamship port contains a population of no less than 7,500,000 persons. Manchester thus offers exceptional inducements for the distribution of American produce on a large scale. For this reason the American railway companies which seek to increase their transatlantic trade are one by one establishing lines of steamers to this port. Herbert M. Gibson, the chief traffic superintendent of the company, visited America some fifteen months ago and completed various arrangements between American interests and the Manchester ship canal, which are working satisfactorily. The canal company has two offices on this side of the Atlantic, one in Toronto, in charge of R. Dawson Harling, and the other in New York, where G. Armstrong is in charge.

Rear Admiral Francis T. Bowles recently visited the New York navy yard to inspect the work on the battleship Connecticut. Work is progressing on the Connecticut satisfactorily and while the department does not hope to complete it as rapidly as the Newport News Co. completes the sister ship Louisiana, still it desires to maintain the same ratio of progress. The navy yard is handicapped by the fact that the government working day is shorter than the ordinary working day.

Howard Gould's steam yacht Niagara IV was launched at the yard of the Gas Engine & Power Co. and Charles L. Seabury & Co., Consolidated, Morris Heights, New York, last week. She is 111 ft. over all, 104 ft. on the water line, 12 ft. beam and draws 4 ft. 2 in. of water. She is of the high-speed type and is intended to be driven at the rate of 23 miles an hour.



## MR. ALFRED NOBLE ON THE PANAMA CANAL.

Mr. Alfred Noble, member of the Panama canal commission, says that the most serious obstacle in the work of constructing the canal is the climate. The canal commission, in its summary of the difficulties, estimated the climate as carefully as it did the cost of construction. He said:

"Personally I believe," said Mr. Noble, "that the methods employed at Santiago and Havana applied to Colon and Panama will transform these pestholes into comparatively healthful cities. Filthy municipal habits have been breeding disease for centuries. When old M. Leblanc told De Lesseps on his first visit that there would not be enough trees to provide crosses for workmen's graves, he was not far wrong. You know, the dean of the medical faculty at Panama divides the seasons into the wet period, from April 15 to Dec. 15, when persons die of yellow fever in from four to five days, and the dry season, from Dec. 15 to April 15, when persons die of pernicious fever in about 26 to 36 hours. The tropics and filth form a combination that only modern science and Anglo-Saxon energy can hope to conquer, and they will conquer. You must remember that the United States will have what the French never had—absolute police authority from ocean to ocean. The example of Santiago is before us. The canal is perfectly feasible from an engineering standpoint. It should be open to commerce in ten years with the aid of modern machinery and from 30,000 to 40,000 men."

"Where are these men to come from?" Was asked.

"Principally from Jamaica. The unskilled laborers must necessarily be negroes, and the negroes of Jamaica and other British West Indian colonies are infinitely superior to those of the other islands. Forty thousand men may be more than this labor market can furnish, but in any case I do not believe American negroes should be employed. The number of men needed will depend on the amount of machinery. Owing to the climate, I imagine, machine will replace hand work wherever possible, even with the cheapest labor. I should say in any event 30,000 would be the minimum."

Mr. Noble thought the American staff, in round numbers, would be 500 men. The machinery will undoubtedly be American. "In handling material," he continued, "I think Americans are first. The Chicago drainage canal is the most perfect example of canal engineering that has been done up to the present time."

Mr. Noble credits the French Panama company, organized in 1894 to take over the De Lesseps wreck, with good judgment and excellent work. "It dug a triangular strip of the proposed excavation straight through the summit at Culebra," he said. "Not only will the actual work done be used in the final construction, but the company thereby could give the most practical answer possible to Panama cities. It had long been said—in fact, engineers insisted on it at the first De Lesseps congress, in 1879—that the cut through the mountain was an unsurmountable obstacle. The ground was thought to be extremely hard to excavate in some places, in others of soft clay, sand and water that could not be held. The company cut a small strip directly through the high ridge, and at intervals sunk shafts to the depth of the ultimate cut. They lowered us 120 ft. down these shafts in a bucket on a windlass. The other big engineering problem is the River Chagres, which rises to great heights during freshets and discharges as much water sometimes as the whole Lake Superior basin. An artificial lake some distance from the canal is to take the overflow. There must be locks to provide for the 20-foot range of tide at Panama, but it is possible to construct a canal without any locks. Such a canal would unquestionably be a great benefit to shipping, but its cost would be enormous and it would take twice as long to build."

Mr. Noble is a firm believer in the commercial future of canals. Referring to the report of the Sault canal for the year, he remarked that the United States is paid back every year in the increase of trade the amount originally invested in this canal.

"I do not agree," he said, "with the Australian postmaster-general in saying that the Panama canal will reduce the Australian trade through the Suez. Most of the Anglo-Australian shipping will continue by the old route, between which is little difference in length, and there is always the short cut for passengers and mail by way of Brindisi. But this does not mean that the Panama canal will not have a great share of the world's shipping."

## SHIP BUILDING AT NEWPORT NEWS.

Newport News, Va., Mar. 25.—The Old Dominion steamship Monroe was given her builder's trial Saturday, going out to the Capes and returning the same evening. The ship behaved beautifully, the tests of anchors, steering gear, machinery, etc., demonstrating that the Monroe will be one of the finest steamers in the coastwise service. No attempt at speed was made, owing to the unfavorable weather conditions. About April 1 the ship will take on a cargo and sail for New York on her acceptance trial and then her speeding qualities will be thoroughly tested. Most of the time during the builder's trial the vessel was steaming in fog, which has been unusually heavy in this section for the past ten days. Officials of the Old Dominion Steamship

Co. who were passengers on the Monroe during the trial were President W. L. Guilledeau, General Superintendent James Leyland, Division Superintendent G. A. Earnest, Superintending Engineer H. J. Higgins, Assistant Superintending Engineer R. S. Haight, Capt. Hulphers and Chief Engineer Charleton, who will be attached to the ship, and M. B. Crowell, agent of the Old Dominion Line at Newport News and Norfolk. The ship yard officials aboard were General Superintendent Walter A. Post; J. F. Rowbottom, superintendent of machinery department; W. C. Foley, assistant superintendent of hull construction, and Messrs. Wills and Palen. The steamer was manned by a crew of ship yard employees. The regular crew will arrive here two or three days before the Monroe is ready to start for New York.

The British steamship Daventry, Capt. Wilson, left the ship yard Sunday after making repairs that cost in the neighborhood of \$40,000 and resulted from the vessel going ashore on the North Carolina coast. The repairs consisted of work on the entire bottom on starboard side, from keel to bilge streak, destroyed floors on starboard side, decks that were damaged to some extent, and the inner bottom, which was pushed up out of place. So well pleased are Sivewright, Bacon & Co. of Manchester, Eng., owners of the ship, with the work done at the yard that they will send the steamship Mancunia here to be surveyed in dry dock. J. Robinson, superintendent of their line, left here Sunday for Boston. He was in Newport News all the time the ship was at the yard. The ship building company contracted to finish the repairs on the Daventry in nineteen days and on the nineteenth day the vessel was ready to be turned over to the owners.

It is now said that the Norfolk & Hampton Roads Ship Building & Dry Dock Co., which proposes to build a ship yard at Sewell's Point, will begin by constructing a marine railway and machine shop. Vice-President Knauss of Columbus, O., will be here in a few days to arrange the details. It is proposed to build the marine railway and machine shop first in order that the company may profit on repair work while the dry dock and the other buildings of the plant are in course of construction.

The Weems Steamboat Co. has purchased the steamer Emma Reis from Wilmington (Del.) parties. The Reis will ply on the Rappahannock river between Fredericksburg, Norfolk and Baltimore. In future one of the North German Lloyd line's steamships will stop here semi-monthly, en route from New York to Bremen, and will take on passengers and coal. An air compressor with a capacity of 1,000 cu. ft. of air per minute, will be installed in the construction department of the navy yard. This, with other machines, will give the navy yard a capacity of 2,000 cu. ft. of air per minute for its pneumatic tools. The cruiser San Francisco has sailed from Newport News for the West Indies to join Admiral Coghlan's division of the North Atlantic squadron. The naval collier Alexander, which broke her shaft at sea and put in at Bermuda, where a new shaft was substituted, has arrived at the navy yard. The naval academy training ship Chesapeake has gone to Annapolis to remain until her departure on her summer cruise.

## BIDS SOLICITED FOR TWO GUNBOATS.

The navy department is advertising for bids for the construction of two gunboats, the bids to be opened on May 19. The bidders may submit proposals also upon their own designs for one of the vessels, though they have the option of bidding also for both vessels upon the department's designs. The general dimensions and features of the vessels are as follows: Length on load water line, 174 ft.; breadth, extreme at load water line, 35 ft.; mean draught at trial displacement, 12 ft. 3 in.; displacement on trial, 1,085 tons. The hull is to be composite built to a point about 2 ft. 3 in. above the load water line amidships, above which line it will be entirely of steel. A double bottom will extend throughout the boiler space and feed water tanks, the latter to be capable of carrying about 17 tons of water. The hull will be completely plated in the wake of these tanks and continuous strakes of plating will be worked in line with the longitudinals. The armament will consist of six 4-in. rapid-fire guns, four 6-pounder rapid-fire guns, two 1-pounder rapid-fire guns and two Colt automatic guns, distributed as follows: Four 4-in. guns on the main deck at side, two forward and two aft, arranged to secure a fore-and-aft fire respectively; two 4-in. guns on gun deck in broadside, arranged to secure about 80° train forward of beam and 45° abaft the beam. The engines will be of the twin-screw, triple-expansion type, supplied with steam from two Babcock & Wilcox boilers.

Circulars asking for bids for the construction of three 16,000-ton battleships of the Vermont class are about to be issued by the navy department. These are the vessels authorized in the last naval act. The ships will be practically identical with the Connecticut and Louisiana, the principal change being slightly heavier armor for the superstructure and slightly lighter armor at the top of the regular armor belt. Bids are to be opened June 3.





### VESSEL OWNERS AND LABOR ORGANIZATIONS.

A sensational feature in lake shipping circles this week is the announcement that officials of the American Association of Masters and Pilots of steam Vessels have ordered their members not to report for duty until certain differences with the Pittsburg Steamship Co. (Steel Corporation fleet) regarding mates of their vessels for the coming season are fixed up. After the Lake Carrier's Association had agreed upon a schedule of monthly wages for mates, the management of the Steel Corporation proposed a season contract, which they claimed was better than the monthly schedule for the men. The members of the Association of Masters and Pilots objected to the season contract and in the controversy that followed some dissatisfaction developed between the management of the Corporation vessels and a few of the men who had been appointed as mates. Then the management of the steel fleet withdrew the season contract proposition, accepting the Lake Carriers' monthly schedule, but the association now claims that although the question is no longer one of wages it will follow that some of their members who were appointed to vessels of the Pittsburg company's fleet will not get places on account of the trouble that arose over the proposed season schedule. This is the cause of the alleged order to all members not to report for duty. A conference on the subject with the executive committee of the Lake Carriers is planned for Friday of this week. Of course not even the vessels of the Steel Corporation fleet are as yet ready to start, so that there is no telling how effective the order of the pilots association would be to its members. Officers of the association are reported as claiming that they have about 90 per cent. of the licensed deck men within their ranks. They certainly have a very large proportion of the captains as well as the mates, and as regards the men on Steel Corporation vessels the proportion is unusually large, as there is considerable feeling against the big vessel organization among the masters and pilots. However, the difficulty now refers to so few men that there is little danger of a general tie-up of the vessels, although such a condition, from the standpoint of freights, would certainly be welcomed by the individual vessel owners. It would do for the smaller owners what they can not do for themselves—keep the vessels in port and thus strengthen the freight market.

The vessel owners and Lake Erie port dock managers have been in conference all week with representatives of other unions and their work will probably run into the coming week. The executive committee of the Lake Carriers' Association has undertaken a settlement of the differences between the Lake Tugmen's Association and the Great Lakes Towing Co. Of course the one main point at issue between these interests is the question of what to do with some thirty or forty men who remained in the employ of the tug company during the strike last summer. All interests are represented at the conference. The Lake Carriers' are also working on a schedule of wages with the firemen, oilers and watertenders and expects to close with these men during the present week. Then will follow a conference between the same men and representatives of the Lumber Carriers' Association.

The Lake Erie dock managers have made progress enough with the representatives of the ore and coal shovelers to look for a settlement within a few days. It has been agreed that the men will be paid 14 cents a ton for shoveling ore as against 13 cents paid last year and that the day shall consist of eleven hours, the same as last year. Details regarding work connected with automatic shovels, etc., are yet to be settled. The increase of 1 cent a ton for shoveling will probably mean an increase to 20 or 21 cents for unloading, which the vessels will pay, as against 19 cents paid last year.

### LAKE FREIGHT MATTERS.

From present indications vessels will be loading iron ore on the lakes, some of them probably on single-trip charters, before anything is done in the way of the usual season contracts. It is certain that the big fleet of the Steel Corporation, unless something now unthought of interferes, will be loading ore at the very first opportunity, probably next week, and this without anything having been done towards the engagement of the so-called outside vessels. With increases all along the line of operating costs, it is not reasonable to expect that vessels will accept an 80-cent season ore freight and they can not get 85 cents. No doubt some of the independent ore interests would be quite willing to pay 85 cents on season contracts

if the Steel Corporation would take the lead, but an early opening and a long season ahead, with large stocks of ore at Lake Erie docks and in furnace yards, has caused the big steel organization to "stand pat" on the lake freight situation, arranging in the meantime to use its own big fleet of ships to fullest capacity. In view of this situation the independent interests dare not make contracts at 85 cents, as they fear the possibility of the big company getting an advantage of 5 cents or more a ton in lake freight by its present attitude of inactivity. Thus the rumor of a possible tie-up of all vessels of the lakes through dissatisfaction on the part of masters and pilots was really in the minds of independent vessel owners too good to be true, as their one hope just now rests in a delayed opening of navigation. Unfortunately they are now, as in the past, unable to agree among themselves upon measures of delay, although it can be said that there is less hurry this year than in any previous year towards fitting out, except in the case of vessels controlled by ore interests.

### MR. FRANK JEFFRIES GOES TO UNION IRON WORKS.

Mr. Frank Jeffries, superintendent of the Lorain yard of the American Ship Building Co., has been elected vice-president of the Union Iron Works of San Francisco, which is now a subsidiary of the United States Ship Building Co., and will leave for San Francisco on Wednesday next to have general charge of the plant at a salary, it is understood, of \$10,000 per year. Mr. Jeffries is a Scotchman, having been born at Aberdeen and having served an apprenticeship in the ship yard of Hall & Russell in that city. He remained with this small though excellent ship building firm for five years, after which he came to this country and sought employment in the New York ship yards. About seventeen years ago he came to the great lakes region and has been a steady and continuous worker ever since in lake ship yards. He was first at Superior and then put in some time at the Wheeler yard, West Bay City, coming to Cleveland after the American Ship Building Co. was formed and taking charge of the Lorain plant. His experience in lake ship building has been uncommonly thorough, and though the years during which he has been working are many he is still a young man, having just passed the fortieth milestone. Mr. Jeffries has never been in San Francisco and, of course, has never seen the Union Iron Works plant. His dealings were entirely with Mr. Lewis Nixon, president of the United States Ship Building Co. Mr. Nixon assured him that he believed lake methods of ship building to be in advance of coast methods in dispatch and economy and that the United States Ship Building Co. desired an energetic and practical ship builder with his eyes fixed upon the cost-sheet as well as the efficiency of the vessel. Mr. Jeffries frankly admitted that he had not technical education, meaning college training, but Mr. Nixon told him that the company was not looking for that kind of a man. The Union Iron Works has some merchant vessels on the stocks and is doing considerable repair work but its heaviest contracts are for warships. It is building one battleship, two armored cruisers, one protected cruiser and two submarines for the navy department. Mr. Jeffries is determined to approach his new labors in the most sensible manner. He has no fads to exploit, no reorganization plans to put into execution, but intends to do his work through the present staff.

Mr. F. C. LaMarche succeeds Mr. Jeffries as superintendent of the Lorain works.

Representatives of the agencies engaged in hull insurance on the lakes met in Buffalo Wednesday and agreed to a continuance during the coming season of the rates that prevailed last year. It was also agreed that there should be no change in forms of policy. Of course as in some past years agreements of this kind may be badly shattered by the operations of insurance brokers, if they can secure reductions in the London market. It is believed, however, that the general disposition this year is to repeat last season's rates and last season's policies.

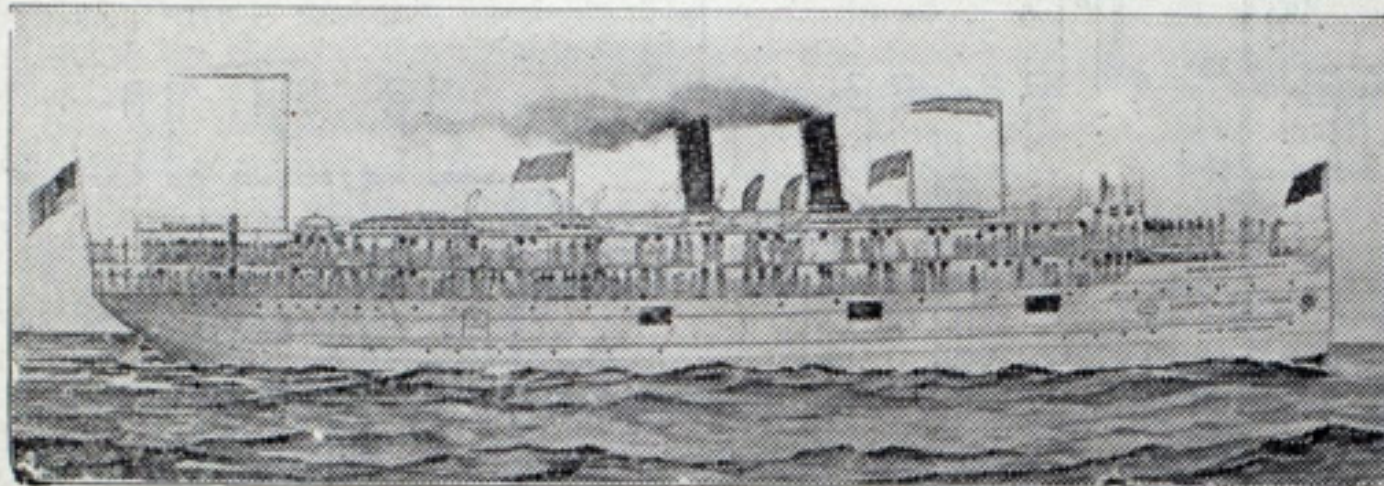
A notice from Commander P. Garst, light house inspector at Buffalo, says of the float lights for Lime-Kiln crossing, Detroit river: "On the opening of navigation three float lights will be placed to mark the easterly edge of this channel. The floats will be small and painted red. The lights shown will be fixed red and will mark the south end, the middle and the north end of the edge of the channel."



### NEW STEAMER CITY OF SOUTH HAVEN.

The Dunkley-Williams Co., South Haven, Mich., speaks with considerable pride of the new steamer City of South Haven, which is being built for Chicago-South Haven service by the Craig Ship Building Co., Toledo. The vessel will be a single-screw steel steamer, 260 ft. long, 4 ft. beam, 16 ft. molded depth, and will draw about 12½ ft. of water, light. Extending the entire length of the steamer will be a double bottom, divided into five water-tight compartments by solid steel bulkheads, making it practically impossible for the steamer to sink in case of accident. She will be equipped with triple-expansion engines, supplied with steam from four water-tube boilers, allowed a pressure of 225 lbs., and intended to generate 3,000 H. P. The vessel is designed for a speed of 20 miles an hour.

In general features this steamer will reach the accepted standard of modern practice. She will be lighted throughout with electricity and will, moreover, be equipped with a powerful searchlight. As is usual in steamers of this type, the passenger entrance will lead directly into the social hall, in which are situated the offices of the purser and steward. The floor of the social hall will be rubber tiled and the walls paneled in dark mahogany. A finely-carved stairway will lead from the social hall to the main cabin, which will be finished in mahogany and



The New Steamer City of South Haven.

[Building at Craig Ship Building Co.'s Yards, Toledo.]

decorated in white and gold. The staterooms, 100 in number, surround the main cabin and its gallery. Every stateroom will be an outside room and will be supplied with running water, call bells and telephone. It is the intention when the steamer touches dock to connect the telephone system with the local exchange so that passengers may transact business if necessary, without leaving their rooms. Plans are also under way for installing wireless telegraphy on board the steamer and it is reported that during the season a little daily newspaper will be published aboard, supplied with news via the wireless route.

Lifeboats will be supported above the hurricane deck and the platform constructed for this purpose will extend to the side of the boat, forming a shade deck and permitting of a clear passageway. On the promenade deck will be a gentleman's smoking room, ladies' writing room and private parlors for the officers of the line. The dining room, with a seating capacity of 150, will be located immediately aft of the social hall. The McCreery cleansing, cooling and humidity regulating system will be installed in the steamer. The City of South Haven will go into commission during the coming season. She was launched on Monday last.

### SHIP YARD ITEMS FROM CANADA.

Surveys made of the burned steamer Montreal by Lloyd's and other officials have revealed the fact that plates on the hull are seriously warped and that the engines are practically destroyed, so that it will be impossible to reconstruct the steamer within the insurance meaning of the term. As a result Mr. John Bertram, representing the builders, has abandoned the vessel, and Lloyd's will proceed to dispose of the salvage. The insurance carried was over £84,000, but it is said this will not cover the entire loss of the Bertram Engine Works Co. At present, however, no definite figure can be put on the loss to the firm through the fire, and so far as the Richelieu & Ontario Navigation Co. is concerned it is impossible to form any estimate of their loss. The Quebec-Montreal service will be carried on much the same as last season and a new steamer will be put on the Saguenay run to replace a smaller one. A new steamer will be built at once to replace the burned Montreal, and it is expected the Bertrams will also secure an order to construct a second steamer for the Richelieu company's line. This is not the first Montreal that has been burned, a former Montreal having been burned off Cap Rouge, on the trip from Quebec in June, 1857, with a loss of 200 lives.

The Bertram Engine Works Co., Toronto, has completed two tugs for the Upper Ottawa Improvement Co. and has shipped them in sections to Lake Temiskaming, where they will be put together. Details respecting these tugs have already been published. The Bertram company is also building for the same company a steel tug 60 ft. long and of 12 ft. 6 in. beam, equipped with fore-and-aft compound engines and a Scotch boiler. This tug will be shipped on the cars complete with machinery installed, early in the summer.

The Collingwood Ship Building Co., Collingwood, Ont.,

has closed a contract with the Montreal Transportation Co. for a steel lake and river tug, 117 ft. long, 23 ft. beam and 13 ft. 9 in. molded depth, to be fitted with triple-expansion engines with cylinders of 15, 25½ and 43 in. diameter by 36 in. stroke, which are to be supplied with steam at 185 lbs. pressure from two Scotch boilers, 11 ft. by 11 ft. 6 in.

The government is having built by R. Davis & Son, Kingston, Ont., a 75-ft. steamer, to have a speed of 18 knots, for the buoy inspection service in the St. Lawrence between Kingston and Montreal.

Napier & Sons of Glasgow, Scotland, are investigating the possibilities of establishing a ship building yard for steel steamers at Sydney, N. S. The firm is one of the oldest in Glasgow and has built many steamers for Canadian owners.

The government steamer Bayfield, engaged until last year in survey work on Lake Huron, has been sold to J. Harrison & Co., Ltd., and will be converted into a tug for log towing on Georgian bay.

### CANADIAN SHIPPING NOTES.

The Canadian Pacific Ry. takes over the Beaver Line and the Elder-Dempster Line April 1, and will operate weekly services to Liverpool and Bristol and a bi-weekly service to London.

Arrangements are being made for a service to Glasgow and other ports, and for an additional service to London, but it is not likely that anything will be done along this line until additional steamers have been secured. The extension of the company's services will depend largely on how the contract for the mail service and the fast line is arranged. The Allan line has secured a renewal of the mail contract for another year, pending the settlement of the fast line question. In shipping circles it is looked upon as a foregone conclusion that the Canadian Pacific will secure the contract for the fast line and that it will place four 20-knot steamers on the route. The railway company is also contemplating adding to its Pacific fleet one or more faster steamers than the three empresses that have been in service for ten years or more.

The Trent Valley canal, which has been under construction for many years, and which is intended to connect Georgian bay via the Severn river, Lake Simcoe and a chain of small lakes and river stretches, through Peterboro, Ont., and Lake Ontario, at Trenton, is attracting a great deal of attention at present. While Trenton is looked upon as being the natural termination on Lake Ontario, Port Hope is putting in a claim for consideration. The chief advantage claimed for Trenton is that it is within the region of the inner channel to Montreal, while from Port Hope there would be 30 miles of open lake navigation to Presque Isle point.

The government cruiser Kestrel, recently completed for service on the Pacific coast, will be officered as follows: Captain, H. Newcombe; chief officer, C. Moore; second officer, W. Anderson; chief engineer, T. A. Allan; second engineer, T. Hurd. Capt. Ackerman has been appointed to the command of the Dominion government fisheries cruiser Georgia, succeeding Capt. Matheson, resigned.

The Discovery, a 376-ton steamer, built at Dundee, Scotland, in 1873, for the Arctic expedition commanded by Admiral Sir G. Nares and Admiral Markham, has been purchased by Blaine, Johnstone & Co., St. John's, Newfoundland, and added to their sealing fleet.

Capt. James F. Forte, for forty years engaged in navigation on the upper lakes from Owen Sound and Collingwood, died at Owen Sound a few days ago. He was master of the steamer William Seymour in 1868 and last year he commanded the Turret Court.

### FAST CANADIAN SERVICE.

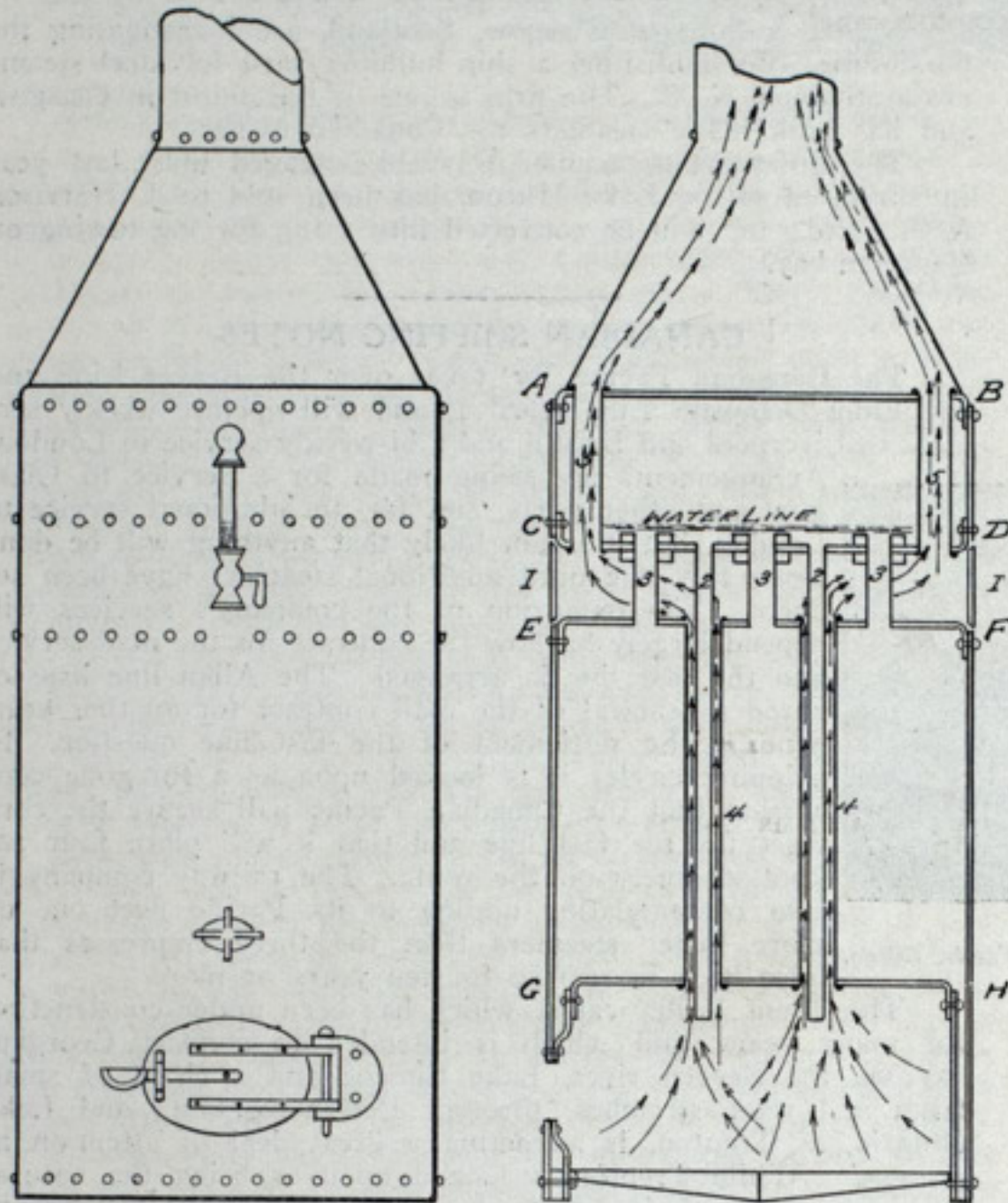
For the fourth time tenders are being invited for the establishment of a fast mail service between Canada and Great Britain. When the Tupper government went out of power in 1895 there was a contract with a responsible firm awaiting ratification. The present administration, however, discarded it. As a result of subsequent action an arrangement was made with Petersen, Tait & Co., which the contractors later found that they could not finance. Last year the Canadian Pacific railway offered to establish a weekly line of 20-knot steamships between the St. Lawrence and Liverpool in summer and between Halifax and Liverpool in winter, for an annual payment of \$1,325,000. This sum seems to have been accounted too large. The new proposal for which tenders are being invited seems to be a compromise. It is to provide for a service, one-half by swift vessels of 21 knots speed and the other half by 16-knot vessels. The outcome of this newest venture will be awaited with interest.

James A. Dumont, recently retired from the position of supervising inspector-general of steam vessels of the United States, was appointed in 1876, twenty-seven years ago, by Secretary Morrill on the personal request of President Grant. In the five years during which the steamboat inspection law had been in operation previous to Dumont's appointment, there had been five supervising inspectors-general.



## NEW TYPE OF BOILER.

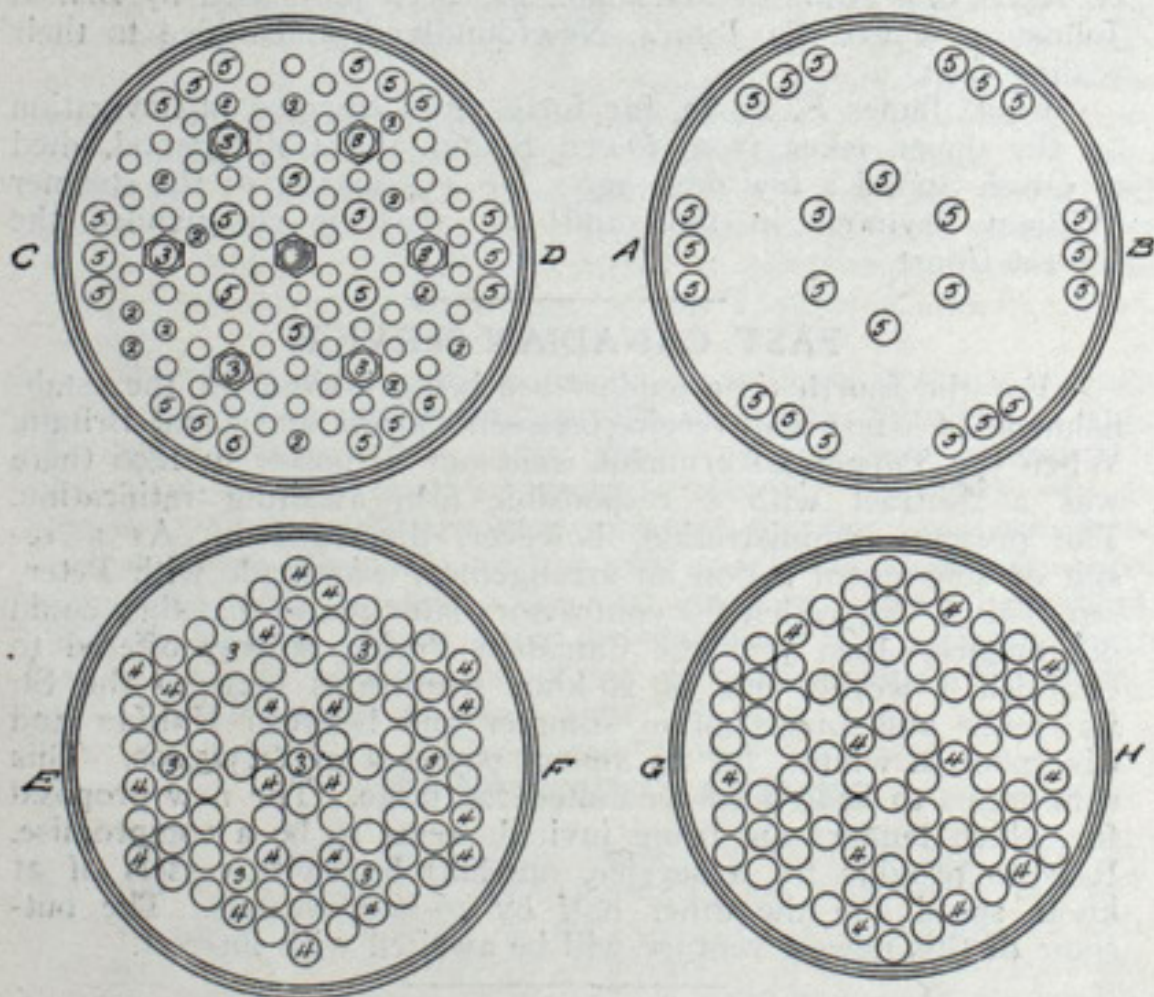
Mr. R. McKay of McKay & Sons, boiler makers, Quebec, has invented a boiler which is, in the repute of those who have seen it, a decidedly original effort and of much merit in cases where economy of space is desired. The boiler has already been patented in this country and some of the European countries. The claims for merit in this boiler are: Economy of fuel as the fire has very much more heating surface to act on than in probably any other upright boiler made; it is practically two



The McKay Type of Boiler.

boilers in one and the fire impinges on the tube surfaces stronger than under ordinary circumstances; the power that can be developed per square foot of floor space and to be greater by far than in any boiler yet built—no small item, says Mr. McKay. The rapidity with which steam can be raised makes the boiler valuable for fire engines, launches, automobiles, traction engines, and in any plant where steam is required quickly for general use, or as a reserve plant when other sources fail, such as water power or electricity.

The accompanying illustrations show the design of the boiler quite clearly. I. is a band to form outside of combustion



The McKay Boiler.

chamber; 2 are water tubes screwed into bottom head of steam dome and passing down through fire tubes (4) in main boiler; 3 are pipes screwed into top head of main boiler and fitted with a nut on each side of bottom head of steam dome to connect main boiler with; 4 are fire tubes from furnace head

to top head of main boiler and through which water tubes pass; 5 are draft tubes from bottom head of steam dome to top head of same; the arrows show the passage of fire from grate bars to smokestack.

## STABILITY OF INSURANCE—GERMAN COMPANIES.

A short time ago the Review had an inquiry regarding the stability of German insurance companies doing business on the great lakes. The inquiry came from a vessel owner who evi-

dently contemplated some business of a liability kind with the German company known as the Frankfort Marine Accident & Plate Glass Insurance Co., whose lake business is conducted by one of the Chicago vessel and insurance agencies, as special reference was made to that company. The trustees of this company in the United States are Stuyvesant Fish, president of the Illinois Central Railroad, Richard Dalafield, president of the National Park Bank of New York, and E. Thalmann of Ladenburg, Thalmann & Co., New York bankers. A request to one of the representatives of the company for information regarding its standing brings all kinds of assurances as to assets and as to the substantial business which the company has been conducting for years, but the interesting part of the letter is a statement of the great care exercised by the German government in all matters of insurance. He says:

"No German insurance company has ever failed in the history of the empire. The German government itself conducts an immense insurance business and through the imperial chancellor of insurance exercises a rigorous and sleepless control over its rivals, the insurance companies. The chancellor's department examines all insurance companies semi-annually, and this in no friendly manner. Unhappy would be the lot of the corporation whose finances were not on the firmest foundations or whose assets were not of the choicest, gilt-edged securities. No stock investments of any description are permitted by these companies—nothing but the best bonds and only those paying interest of 4 per cent. and under that figure. Bonds paying a higher rate than 4 per cent. are regarded as speculative and are not favored by the examiners. Under the laws of Germany, stockholders in insurance companies are individually liable for corporation indebtedness to the full extent of their assets. Should the company's assets fail to balance its liabilities, to provide for the immediate realization of any sums necessary to meet sudden or extraordinary demands upon corporation's resources occasioned by any calamity, the stockholder is required to deposit in the treasury demand notes for double the amount of his cash investment for stock. These notes must bear two responsible endorsements. This discourages any but the wealthy from investing in insurance stocks and gives to the insurance companies not only the advantage of such a condition together with assets amounting to practically double their entire capitalization, and behind that again stand the private fortunes of the entire body of stockholders. The actual available assets of a German insurance company are thus made practically unlimited.

"These onerous conditions necessarily impose extreme conservatism in the conduct of business, the most careful selec-



tion of corporation officers and directors and the adherence to the safest and most scientific principles of insurance underwriting. Rarely, if ever, does a company carry the entire amount of insurance written on any one risk. German underwriters believe that the highest degree of safety lies in diversity of risk and limited insurance. This belief has given rise to the famous system of syndicate underwriting whereby companies form themselves into groups for the purpose of mutual insurance and protection. These groups consist usually of five or seven companies and commonly such groups will again co-operate with other groups similarly constituted, with the result that often as many as fifteen or twenty companies will underwrite one risk. The great advantage of this method to an insurer is apparent and the method illustrates the proverbial caution of the German in the conduct of commercial enterprises.

The government examinations are made semi-annually, somewhat after the manner in which the United States government examines national banks. The German examiners, however, possess more extensive powers than are conferred on the bank examiners in the United States and may proceed to more arbitrary and drastic measures should the results of the examination disclose any discrepancy between the company's statement to the government and its condition at the time of examination and should the interest of the policy holders be found in jeopardy. There is probably no country in the world where the government has thrown such a rampart of protection around the insuring public as has Germany, and it seems difficult to conceive how any combination of circumstances could arise which would hinder, even temporarily, a German insurance company from meeting all its policy obligations in full on demand.

"As I said in the beginning, no German insurance company has ever failed and it is a safe guess that none will while the empire lasts."

#### ADVANTAGES OF THE BARGE CANAL.

In a pamphlet issued by the Canal Association of Greater New York a vast amount of information is given concerning what canals really mean to New York state. The effect on general commerce of the decline in amount of tonnage passing through the Erie canal is made plain and a long list of business reasons for canal improvement advanced. Senator Depew is given as authority for the statement that railroads do not oppose canals, as they prove so great a lodestone for commerce that they add to the business of the railroads instead of decreasing it. All these facts are grouped about the movement represented by the bill known as the 1,000-ton barge canal measure now before the legislature. The statements are made in the form of questions and answers, among them being the following:

Why, with the advantage of the Erie canal, has New York begun to lose its relative advantage and place in certain lines of business? This is due simply to the decline of commerce on the Erie canal, and this decline is due to the decay in the physical condition of the canal and to the antiquated methods of transportation employed thereon. Its efficiency and relative usefulness have thus gradually declined, and have shrunk into insignificance in comparison with other means of transportation.

How do average rates on the New York canals compare with railroad rates? The average rates on the New York canals have declined from 6.5 mills per ton per mile in 1865 to 1.9 mills per ton per mile, the present average being about one-half of the average rate by any railroad, and one-third of the average rate by most roads.

What will be the result if New York state fails to improve the Erie canal system? Canada by building the Georgian bay canal, at a cost between \$70,000,000 and \$80,000,000, will cause the diversion of a large part of American trade, which naturally would seek an outlet by way of Buffalo, the Erie canal and New York city. Canadians calculate on a tonnage of about 8,000,000, and a strong sentiment favors building the canal, which will have a length of 430 miles, a service width of 188 ft., a bottom width of 100 ft., and a depth of 20 ft. While the British possessions of North America are equal in area to those of the United States, the entire wealth and population of the dominion are much less than those of New York state alone, so much so, that relatively New York state is four times better able financially to rebuild the Erie canal than the dominion is to build the Georgian bay canal.

Why is a ship-canal not feasible? Because of its prohibitive cost. For this reason it is improbable that the national government will ever undertake such a project. Even if one were constructed it could not be used by ocean-going steamers. The types of the vessels used for ocean and lake transportation are radically different, and in the opinion of the ship builders it would be impossible to combine the type in one vessel that would be economical for the trip through the three kinds of navigation required—lake, canal and ocean.

Why is a 1,000-ton barge canal the most practical? Because all the supply of water that can safely be calculated upon under this estimate would be utilized by the 1,000-ton barge canal.

Will transportation by a 1,000-ton barge canal lower the freight rates per ton per mile? Yes; the rate will be .52 mill per ton per mile.

Will the railroads be able to compete with this rate on heavy freights? No; the New York state canal committee, after

a careful inquiry of this matter, state that there is no probability of the railroads being able to carry freight at 1 mill per ton per mile.

Will transportation by 1,000-ton barge canal be the means of abolishing the differentials in railroad freights and stop diversion of commerce from the state and city of New York? Yes.

What is the saving in cost to shippers by the 1,000-ton barge canal over the present 240-ton canal? The saving is about two-thirds, or the difference between 1.75 mills per ton per mile by the present canal, as against .52 mill per ton per mile by the 1,000-ton canal.

How long would it be before the direct saving to the people in the reduction of canal and rail rates would offset the cost of construction? It has been expertly estimated that the reduction would return the entire cost, \$100,500,000, in less than ten years.

How do the returns compare with the outlay? "Down to the close of the year 1882, at which time the tolls were abolished, the revenues collected on the Erie canal exceeded all sums paid out upon it for any purpose whatsoever by the sum of \$42,599,718. This profit has been reduced in subsequent years by the expenses for ordinary and extraordinary repairs, maintenance of operation, and for enlargement under the nine million dollar act, and against this outgo for expenses there has been no income from tolls, so that the net balance to the credit of the Erie canal is now a little more than \$20,000,444. It is important that this fact should always be borne in mind, that the Erie canal has paid into the state more money by many millions of dollars than has been spent upon it in the aggregate for any and all purposes whatsoever. Were this not the fact we should not advise its enlargement." (Report of committee on canals, 1899.)

#### TO ESTABLISH MAGNETIC RANGES.

Some time since Capt. George P. McKay, chairman of the committee on aids to navigation of the Lake Carriers' Association, appealed to the navy department through the hydrographic office, for a set of magnetic ranges, suggesting that one be located in the Straits of Mackinaw and the other in St. Mary's river. Mr. Charles H. Darling, acting secretary of the navy, has now written to him that the chief of the bureau of equipment has recommended the establishment of the ranges and that the department has approved the recommendation. The report of the bureau is as follows:

"The bureau approves the proposition to establish magnetic ranges at convenient points on the great lakes. Undoubtedly such ranges would be of great convenience and assistance to vessels engaged in lake traffic. It is recommended that when navigation opens in the spring the commanding officer of the U. S. S. Michigan be directed to confer with the chairman of the committee on aids to navigation of the Lake Carriers' Association, select the most convenient points for the establishment of magnetic ranges and submit for the consideration of the department a complete plan of the location selected, character of marks to be erected, and an estimate of cost of the necessary survey and completed range marks. The cost of survey and range marks, when authorized, to be paid from the appropriation for ocean and lake surveys."

#### NOT AN ENCOURAGING OUTLOOK.

Viewing the coming opening of navigation from a head-of-the-lakes standpoint, G. A. Tomlinson, vessel agent of Duluth, says:

Grain in store in local warehouses aggregate 12,000,000 bu. One year ago the local elevators contained 17,000,000 bu. One half of the grain in store is wheat. How much of this grain will go forward at the opening is difficult to forecast. There is less than 750,000 bu. under charter and these engagements were made last December. It is simply impossible to sell wheat and the outlook is not encouraging. Some flax will move at the opening but no bookings have been made. Some chartering has been done at Fort William at 2¼ cents.

Weather conditions are about on a parity with one year ago. There is, probably, a little more ice in the harbor—about thirty inches—but it is badly honeycombed. Outside the harbor there is some floating ice. Vessels will doubtless be moving about the harbor between the first and the fifth of April."

A Chicago dispatch announces the organization of the Chicago & Great Lakes Dredge & Dock Co., by the consolidation of the Lyden & Drews Co. of Chicago and the Hausler & Lutz Dredging & Dock Co. of South Chicago. The new company will have eleven tugs, a like number of dredges, a fleet of seventy scows and twenty pile drivers. It is said that contracts will at once be closed for a steel hydraulic dredge and a dipper dredge, both of which will exceed in capacity anything now in service on the lakes. W. A. Lyden will be president and T. C. Lutz vice-president of the new company. Both of the concerns going into the consolidation have long been engaged in government and private work.

Canal officials of Canada are planning for the opening of the Welland canal about April 10, which is fully ten days earlier than usual.



### MODEL AND STORY OF THE WILLIAM R. CROWELL.

The model of the steamer City of Detroit, worked out by Mr. R. J. Barrow of Cleveland and published two weeks ago in the Review, caused Mr. Harry E. McArthur of Saginaw, Mich., to send on a photo of a model which is the product of his own jack knife. It is a model of the tug William R. Crowell. The story of the making of the model is told in Mr. McArthur's own words as follows:

Chapter 1.—One beautiful morning in the latter part of June, 1903, the sun was just starting from Muskegon to Chicago and the scene was a grand one as I saw it from the Rush street bridge in Chicago, and that which made it more perfect was a tug and vessel coming into the Chicago river. As it came through the draw I could not help but admire the tug. Being somewhat of a genius I promised myself that sometime I would reproduce the William R. Crowell in the form of a working model, having no picture or anything to work from only a good eye and memory. The dimensions of this tugboat are as follows: Length, 30 in.; beam, 6½ in.; depth, 6 in. The boiler is made from a piece of seamless brass tube, 3 in. in diameter



Model of the Tug William R. Crowell.

and 7 in. long, with alcohol lamp so arranged that when the boiler is filled the lamp will have burned out before the water in the boiler is dangerously low. The engine was carefully built, having a cylinder ¾ in. diameter with ⅞ in. stroke. The propeller wheel was made from a full view of the Sheriff's Mfg. Co.'s ad in the Review—that is the cut was used as a guide to build it. When once started she will run 1½ hours in the water. The Crowell was one of the Dunham tugs and like the rest of her line was well kept up.

Chapter 2, The Fate of the William R. Crowell.—On Dec. 3, 1893, (11 o'clock at night) the propeller F. W. Wheeler stranded 3 miles north of Michigan City, Ind. At once telegrams were sent to Chicago for tugs to go to the Wheeler's assistance. The tugs Perfection and William R. Crowell were sent and when about half way across the lake the Crowell blew a distress whistle and the Perfection ran alongside. While the crew climbed to the rail of the Perfection the William R. Crowell sank from beneath their feet and to my knowledge was never located.

### DULUTH NEWS NOTES.

Duluth, Minn., Mar. 25.—Night work has been suspended at the yard of the Superior Ship Building Co., where two ships for the Provident Steamship Co. and two for the Great Lakes & St. Lawrence company are being constructed. The first to be launched will be the St. Lawrence boats, about May 15. The two ships for the Provident company will go into the water in June, the D. M. Clemson on the 1st, and the D. J. Kerr two weeks later. Mr. Clemson is president of the Pittsburg Steamship Co. and Mr. Kerr is ore agent of the United States Steel Corporation. As soon as the Clemson is launched the keel of a 440-ft. ship for the Gilchrist company will be laid.

A slight movement of ore from mines to Minnesota docks begins this week. It is only from mines whose stockpile room is filled already and will be small for some little time. No ore train schedule will be in force for some time.

Contracts for the stripping of the small Mesabi mine found by the Cleveland-Cliffs Iron Co. in section 31 56-22 has been let to the Drake & Stratton Co., and preliminary work is under way. The mine will make a small shipment this year. Though the surface is not great the milling process is considered best, in view of the character of the ore.

Three good mines, Crosby, Deering and La Rue, are being opened this season at the new village of Nashauk. The Deering and La Rue will be under the management of Jos. Sellwood of Duluth. These are the most westerly operating properties on the Mesabi range and will be considerable shippers this year, all over the Great Northern road.

In all nineteen new mines are under development this sea-

son in the Mesabi district, in addition to as many more that made small preliminary shipments late last year and have been developed to produce largely now. Many of these mines will be but small shippers for the first year, and others will take the place of some that will either go out of business or will reduce their output from a year ago, but the indications are for a very material increase over the year before. Such a new list has never been equaled on any Lake Superior range since mining began.

Mr. J. C. Evans of Buffalo, who is to be western manager of the Anchor Line after April 1, has been at Duluth for some days. Mr. Evans looks for an important year in the package and flour freight trade. The new steamship Tionesta, he says, will go into commission April 1.

### OUTLOOK FROM A BUFFALO STANDPOINT.

Buffalo, Mar. 24.—The outlook here for the coming season is on the whole more favorable to the vessel owner than it was a month ago in everything but lumber and that remains as unsettled as ever. Nobody really knows whether the lumber fleet will make much of a season or not, but at least there have been worse outlooks than the present one.

The start in hard coal has exceeded expectations. Not that there was any doubt of a demand and an early one, but it was feared that there would be no coal. While the country was clamoring for coal the companies were not at liberty to disregard the demand and lay down anything for lake shipment, but that demand suddenly stopped and the clamor ever since has been to shut off orders that had already been booked. At the same time the coal roads began to bring in more coal here than the west-bound roads could take care of and there was nothing to do but to allow it to accumulate. Soon one or two companies found themselves so filled up with coal that they began to look for lake tonnage to relieve their cars and they began to take it at a rapid rate.

It is stated that from 125,000 to 150,000 tons of room has already been taken and 40,000 to 50,000 tons loaded. The fleet will start out as soon as April and insurance open, unless the indications are false. A letter from Port Colborne states that there is already open water enough on the north shore to enable a steamer to reach Long Point, so that if no heavy wind down the lake sets in there will be no jam here to go through.

The prospective retirement of John J. McWilliams from the hard coal shipping trade, not yet officially announced, is one of the chief matters of interest in the lake traffic. As the head of the Lackawanna office here so long, he has directed the shipment of more hard coal by lake than any other man. He will now pay more attention to vessel matters, though abundantly able to retire from business permanently. Details of the change are not available at present.

It is going to be a glorious season in package freight, as matters look now. Never has there been so much freight ready at this time of year as now. Indeed the rule is none at all west-bound for close to a month yet and not much east-bound unless it be a little flour, so that grain generally had to be taken till about the time of canal opening to piece out with. It is quite otherwise now. Weeks ago there was freight clamoring to go from both ends of the route. All this is on account of the failure of the railroads to keep up with business. So badly handicapped are they that they are not expected to interfere in any way with the lake lines, so that the authorities were able to hold their spring meeting here the other day and agree on last fall's rates both ways without the slightest expectation of being disturbed in them.

The suit of the Maytham interest in the name of George W. Maytham against the St. Clair management of the steamer America brings to the surface a dispute that has been on ever since the steamer passed from the control of her Buffalo owners. They still have a considerable interest in her but are entirely dissatisfied with the management, so they undertook to dissolve the partnership, as they state, by offering to buy or sell, and not being able to bring about this sort of dissolution they have appealed to the courts. The division of only \$2,000 in profits from the America's season, as against \$14,000 on the part of her sister steamer Brazil, is one of the causes of the difficulty.

There seems to be no doubt of the building of the ship canal northward from the mouth of Buffalo river to the still water of the Niagara. Major Symons looked after that project and has carried it well on towards a certainty. Although he is not to be with us much longer, it is pleasant to know that he will still be within easy call and he has taken too much interest in Buffalo to forget us when we may still need him. With the improvement to the steel plant four miles southward and the ship-canal four miles northward, and four miles more of inside waterway, there is room for indefinite development.

The elevator situation is not as promising as it used to be, even when the unthinking or envious public was crying out "monopoly" or "piracy," for the railroads can hardly handle the reduced number now in use and a restored canal system is much needed to enable us to hold the lead we have so long maintained, and which once lost will be a distinct loss to the lake trade as a whole, for no other port can take it up successfully and it will scatter to many routes.

JOHN CHAMBERLIN.



## LAKE SHIP YARD MATTERS.

Some delay has, of course, been encountered of late in the launching of new vessels at lake yards, especially at the South Chicago and Lorain works of the American Ship Building Co., on account of strikes, but it would seem now that these labor difficulties are over with, at least until June next, when a readjustment of agreements between the men and employers is contemplated. The trouble at Chicago, as well as at Lorain, is understood to have been amicably settled. The launching of the steamer P. P. Miller at the Buffalo works of the American company for the Miller Transportation Co. of Buffalo, is still delayed by some differences with the men, but a speedy adjustment at that point is also expected. One of the new steamers for the United States Transportation Co. (Brown fleet) would have been launched at Lorain this week but for the strike. This vessel will now go overboard shortly, and it is expected that progress in all the yards, which are filled to their utmost capacity, will be quite marked during the favorable weather that is expected for the next two months.

On Saturday last the Columbian Iron Works, St. Clair, Mich., launched the steamer Winnebago for the Iroquois Transportation Co. of Chicago, which has the distinction of being the first vessel launched by this ship building company. The Winnebago is 234 ft. over all, 210 ft. keel, 30 ft. beam and 15 ft. deep. As soon as the keel blocks can be arranged, work will begin upon one of the two Gilchrist steamers for which the company has contracts. At present between 500 and 600 men are employed at this ship yard.

It is reported that Capt. James Davidson's ship yard at West Bay City will be closed as soon as the wooden schooner now on the stocks there is launched. Steel has practically replaced wood as ship building material on the great lakes. The dry dock, however, will remain in commission and there is talk of putting in machinery to repair steel as well as wooden vessels.

At a meeting of directors of the Indiana Transportation Co., Michigan City, Ind., held a few days ago, it was decided to increase the capital stock \$75,000 and to build a new steamer. The new vessel is to be a steel steamer, somewhat larger than the Soo City, but it will not come out until 1904. It is estimated that the new vessel will cost about \$100,000.

The Collingwood Ship Building Co., Collingwood, Ont., has it is understood, secured a contract for a steel steamer of canal size. Manager Calderwood is also figuring upon estimates for other steamers.

## LUMBER FREIGHTS.

At a meeting of the board of managers of the Lumber Carriers Association held in Detroit Wednesday, districts or sections were made to cover the different upper-lake shipping ports and rates from the several districts established as follows:

Sec. 1, from the head of the lakes to Keweenaw point; rate from this section to Chicago and Lake Erie ports, pine, \$2.50 per 1,000 ft.

Sec. 2, from Keweenaw point to Whitefish point; rate to Chicago and Lake Erie ports, pine, \$2.25 per 1,000 ft.

Sec. 3, Whitefish point to Detour; rate to Chicago and Lake Erie ports, pine \$2 per 1,000 ft.

Sec. 4, from Straits of Mackinac, including Lake Huron and Georgian bay; rate to Chicago and Lake Erie ports, pine, \$1.75 per 1,000 ft.; hemlock 25 cents extra.

Sec. 5, north end of Lake Michigan to a line drawn from Green bay to Traverse city; rate to Lake Erie, \$2 per 1,000 ft.

Sec. 6, including the balance of Lake Michigan; rate to Chicago and Lake Erie, \$2.12½ per 1,000 ft.; hemlock 25 cents additional; hardwood 75 cents per 1,000 additional.

The rate to Oswego is to be 75 cents above the Tonawanda rate and to Ogdensburg \$1 over Tonawanda rate. From district No. 1 to Bay City the rate, pine, is to be \$2.25. Timber, 6x6 to 8x10 is to pay 25 cents per 1,000 over pine rates; 10x10 and larger timber, 50 cents per 1,000 ft. extra over board rates.

Separate rates were made from St. Ignace and Cheboygan to Chicago. They were \$1.75 on dry white pine, \$1.87½ on green and 12½ cents additional over above rates on hemlock. Basswood same as hardwood, 50 cents over pine rate.

Nothing was done in regard to fixing an opening date, although the carriers favor a late start. They say they will not get under way before April 15.

## APPOINTMENTS OF MASTERS AND ENGINEERS.

Hawgood & Co., W. A., Cleveland: Steamers—Bransford, Capt. Jas. Owen, Engineer John Chapman; J. M. Jenks, Capt. Fred Ahlstrom, Engineer Jas. Norton; H. B. Nye, Capt. Alva Keller, Engineer James Bennett; Iosco, Capt. N. Gonyau, Engineer A. B. Wilson. Schooner—Olive-Jeanette, Capt. W. A. Searles.

Union Steamboat Line, T. T. Morford, Mgr., Buffalo: Steamers—Starrucca, Capt. Walter Robinson; Ramapo, Capt. J. H. McDonald; Chemung, Capt. F. B. Huyck; Owgo, Capt. John Dugan; Tioga, Capt. John J. Wulke; Binghamton, Capt. Geo. T. Morris. Appointments of engineers not made as yet.

Western Transit Co., Buffalo: Steamers—Arabia, Capt. John Kennedy, Engineer W. C. Gilbert; Auburn, Capt. Edward

Roberts, Engineer Chas. L. Murray; Boston, Capt. Henry Murphy, Engineer Wm. McNulty; Chicago, Capt. S. R. Jones, Engineer Henry Hess; Commodore, Capt. F. D. Osborn, Engineer John Metke; Milwaukee, Capt. John Davis, Engineer M. J. Laney; Mohawk, Capt. John Fisher, Engineer Frederick W. Hale; Montana, Capt. H. Holmberg, Engineer Albert Scott; Rome, Capt. H. L. Dennis, Engineer Wm. Tibby; Syracuse, Capt. Thos. Slattery, Engineer John W. Mark; Troy, Capt. Donald Gillies, Engineer Frank A. Miller; Vanderbilt, Capt. F. J. Johnson, Engineer Jas. Sangers; Yonkers, Capt. Michael Folan, Engineer John W. Rainey.

Montreal Transportation Co., Montreal, Que.: Steamers—Rosemount, Capt. John Wood, Engineer R. Taylor; Westmount, Capt. A. Milligan, Engineer —; Fairmount, Capt. F. C. Telfer, Engineer —. Schooners—Hamilton, Capt. Jas. Kirkwood; Quebec, John Phillips; Minnedosa, Capt. R. C. Irwin; Selkirk, Capt. R. Gillies; Winnipeg, Capt. —; Melrose, Capt. H. Milligan; Dunmore, Capt. R. A. Davey; Augustus, Capt. Chas. Staley.

Lehigh Valley Transportation Co., Buffalo: Steamers—Mauch Chunk, Capt. P. McFarlane; Wilkes-Barre, Capt. D. Driscoll; Saranac, Capt. C. A. Potter; Seneca, Capt. J. A. Whiteside; E. P. Wilbur, Capt. C. H. Fuller; Tuscarora, Capt. W. Williams.

## AROUND THE GREAT LAKES.

Charles R. Percy, purser on the steamer Idlewild last summer, will serve the White Star Line in a similar capacity on the Owana this year.

Capt. Duncan M. Smith, a well known lake navigator and owner of vessel stock, died suddenly of apoplexy at his home in China, Mich., last week.

In the case of John Corrigan vs. the steamer Cumberland, collision, trial has been had in the United States district court at Cleveland and taken under advisement.

Capt. Luman P. Cole died Wednesday at Buffalo. Capt. Cole for several years had been master of the police boat Gov. Morton. Previous to that he was master of several tugs.

Eastland is the name selected for the fast passenger steamer building at the Jenks works, Port Huron, for the Michigan Steamship Co., to run between Chicago and South Haven.

The tug Grace M., owned by Capt. Galbraith of Huron, was nearly destroyed by fire one day last week. Her cabin and all the upper works were destroyed. She will be rebuilt at once.

Capt. A. J. Greenley will bring out the new steamer W. H. Mack, building at the Cleveland yard of the American Ship Building Co. Capt. Greenley was in the steamer William Fitch last season.

Capt. J. M. Fields, compass adjuster who has a compass instrument that is in great favor on the lakes, has returned to Cleveland from California and will remain on the lakes throughout the navigation season.

The steamer John Spry will be known hereafter as the Three Brothers. The vessel is owned by the White Lumber Co. of Boyne City, Mich. There are three brothers in the company and the vessel's name was changed in honor of them.

Mr. E. T. Douglass, assistant general manager of the Western Transit Co., is still in charge of the six Northern Line package freight steamers purchased for the four trunk line railways—Erie, Lehigh Valley, Lackawanna and New York Central—that operate similar lines out of Buffalo. It is said that a superintendent for the Northern steamers will be appointed shortly.

F. C. Reynolds, for many years secretary and general manager of the Goodrich Transportation Co., has resigned to accept the position of general traffic manager of the Manistee, Ludington & Milwaukee Transportation Co. The latter company recently purchased the steamers Pere Marquette Nos. 2, 3 and 4, which will be operated between Manistee, Ludington and Milwaukee.

Vessel interests in Canada do not look with favor upon canal tolls, fees for inspection of vessels, fees to collectors of customs, etc. Canals of the United States have been entirely free of tolls for years past, and as far back as the first administration of President Cleveland all fees to customs collectors for manifests and other papers, fees to inspectors for licenses, etc., were abolished. The Kingston board of trade is asking co-operation from commercial bodies of Canada in a movement to bring about the abolition of similar fees in that country. They say that these tolls and fees are unfair in operation, to a serious extent prejudicial to the interests of the Canadian merchant marine, and consequently damaging the prospects of the whole trade and commerce of the country. Respecting the charges for steamboats, it is contended that inasmuch as the service is for public safety, the expense of maintaining it should come from the public, and not from the steamboat owners, a principle effective in the United States. It is contended that no restriction should be placed on the use of the canals, because existing charges result in the diversion of traffic from Canadian to the United States waterways, where no tolls are levied. As the main reason why traffic on the Welland and St. Lawrence canals should be exempt from charges it is pointed out that no tolls are charged upon the Erie, which is the chief competitor of the Canadian waterways.



## CAPTURING OF PACIFIC TRADE.

[Harrington Emerson in the Engineering Magazine.]

A few years ago, steamers no longer fit for the Atlantic or Indian service were sent to the Pacific as being quite good enough for all requirements. With the exception of the Empresses, built for the Canadian Pacific Railroad, there was not, until the Spanish American war, a first-class steamer on the American Pacific. Now, the largest steamers ever constructed in American waters, and with one exception, the Cedric, the largest steamers ever built, have been ordered for the Pacific Ocean traffic. What has brought about the change? The reason for the former low state of shipping is obvious. The Pacific coast states are not as yet a manufacturing region. They are largely importers of eastern manufactured goods. Their own exports are raw materials, and with the exception of flour not such as the orient demands. Exports to the orient must come from the eastern and southern states—railroad iron and other equipment, mining machinery, tobacco and cotton—and for these goods the usual railroad rate across the continent is prohibitive, as it costs almost twice as much to send boxed goods from New York to San Francisco as from New York to London and thence by steamer direct to Puget sound via the Suez canal, and straits, Hongkong and Yokohama. The average railroad rate across the American continent in carload lots is \$15 a ton; the rate on similar goods from London to Seattle is \$10 a ton; and one of the chief obstacles to a lowering of the railroad rate through ocean competition is the requirement that American goods may not be shipped from an American port to an American port except in American bottoms. Before there could be any hope of a large increase in Pacific coast exports and imports, the whole railroad situation had to be changed; and this is what has happened.

San Francisco was easily the queen city of western America, and not only on account of the great wealth and equally great enterprise of the Californians, but because it was the only western city, it became the terminus of the first Pacific railroad, built in an era when roads were constructed to enrich the promoters and not to make money out of operation. On the old Pacific road, now so differently managed, there was one determining factor, namely, the competition from sailing vessels around Cape Horn.

Mr. Huntington imagined that by occupying the narrowest part of the United States between the Atlantic and Pacific he would always be able to control the trans-American traffic, little foreseeing that a constructive instead of monopolistic policy would be able to carry cotton from Texas to Puget sound at a cheaper rate than his road would carry it from Galveston to San Diego. The era of monopoly ended with the construction of competing lines to the Pacific coast, which have resulted not only in the substitution of American manufactures for British in California, but also in the development of the California fruit trade. The Pacific Mail, aided by a subsidy for the mails, maintained freight and passenger relations between Hawaii and the United States and relied for a large part of its income on the Chinese coolie trade, first to California and then to Hawaii; but it brought also silks, tea and curios, thus making a beginning of a Pacific and Oriental traffic and trade.

In the meantime the Bonanza wheat farms of North Dakota had stimulated railroad building in that prairie region, and aided by the largest railroad land grant ever given, about 80,000 square miles, one of these roads pushed through to the Pacific, making its terminus at Tacoma, on Puget sound, which is by far the best harbor on the Pacific coast. This was still in the era of speculative railroad building, and it is not unfair to say that the Northern Pacific was built, not for the sake of any traffic immediately in sight, but to capture the land grant. The Canadian Pacific, from Montreal to Vancouver, paralleling the Northern Pacific at a distance of 300 miles and playing on the idea of international rivalry, was also built by grants and subsidies, and it became a competitor of the first importance, because, being subsidized and wholly beyond American control and largely beyond American pooling arrangements, with its terminal boat service it could and did reach every American Pacific coast city, and made strong bids for a share of the traffic.

There was, however, a stronger force yet to change the future, and one that distinctly inaugurated a new era. The Great Northern Railroad, a wheat road of Minnesota and North Dakota, had been developed and made by one man, Mr. James J. Hill, who, living on the lines of his roads, from the very first built not for the sake of bonds or subsidies, but for the immediate and prospective traffic. Having made a great success of prairie roads, just when speculative building in American roads had ended, Mr. Hill began to reach out towards the Pacific and completed his through line in the darkest days of financial and industrial depression, but when steel and labor were at their lowest. All other transcontinental railroads had been constructed with an eye to west-bound traffic. Mr. Hill's road was built for east-bound traffic. The wheat cars, filled to overflowing at the crop-moving seasons of the year and then standing idle on side tracks of Dakota, could be utilized all the year through to carry Washington lumber eastward.

The terminus of this road was Seattle, also on Puget sound, and also with great natural terminal facilities. The "Empress line" from the terminus of the Canadian Pacific at Vancouver had become the fastest and best-patronized line across the Pacific. At Vancouver were unlimited supplies of good coal at very low price, and the route to Yokohama, Hongkong and India is over 1,000 miles shorter than the first established route via Hawaii. Seattle and Tacoma have at their back doors coal fields more extensive than those of Vancouver. These two cities are as near to the Orient as the Canadian Pacific terminus, so Mr. Hill, feeling sure that he could divert a part at least of the tea and silk trade to his own railroad line, early formed an alliance with the greatest of Japanese lines—the Nippon Yusen Kaisha—a line in ocean tonnage ranking among the foremost in the world, adding the factor of the very low cost of operation of steamers under Japanese control to the other advantages of cheap coal and short route. This was at a competitive period when he regarded the other transcontinental lines as rivals; and as an example of what could be done the Great Northern actually invaded the Southern California fruit regions, brought fresh fruit by steamer to Seattle, and sent it in the cool northern spring to Chicago, making shorter time than by the southern roads. Owing to the development of the Washington lumber industry, the traffic east-bound much exceeds the west-bound freight. It became plain that as the northern roads, all of them, earned dividends in the prairie regions from their grain traffic and paid all the expenses of western operation by the east-bound lumber traffic (thus reversing the conditions that had prevailed for all the southern roads) it would be possible to carry west-bound freights at nominal rates—any rate above the cost of handling and the slight increase in expense of hauling full cars instead of empties. With the establishment of the Nippon Yusen Kaisha line, which fortunately occurred when the price of wheat and flour was at its lowest, the Oriental trade began to assume large dimensions, the steamers going out with full orient-bound cargoes, but bringing back comparatively little. It was during this same period that a great number of Japanese cotton mills were started, the cotton being imported from the United States by way of London and Hamburg.

All the conditions were now favorable for a revolutionary move of world-wide importance. The Northern Pacific paralleled the Great Northern; both started at St. Paul; and both reached Seattle; both had many branch lines in the grain fields of Dakota; both ran through the richest lumber forests of Washington. The Burlington, a corn road, reaching St. Louis, was an ally of the Northern Pacific, having effected a junction with that road at Billings, Mont., yet with rumors of its own extensions to the coast. It was the part of wisdom to utilize existing roads to the fullest rather than to build new ones, to combine the two roads that parallel each other and had absolutely identical interests, and to control the Burlington, which at once afforded a direct outlet for Washington lumber to all the treeless central states, eight or nine in number, and also with terminals at St. Louis, directly connecting it with many of the southern cotton roads. Therefore, with dramatic unexpectedness the Northern Securities Co. was formed, identifying these three roads, with the deliberate intention of diverting the cotton exports of the United States to Asia by way of Atlantic and European ports to the ports of Puget sound. The temporary and apparent rivalry between the combination of the northern and of the southern roads was but an episode. It is not a question as to whether Puget sound ports shall not be favored in transcontinental rates compared to San Francisco, or whether the Great Northern shall carry fruit from southern California to Chicago, but whether the unlimited trade of eastern Asia shall pass to Europe by Pacific American steamers and American railroads, or continue to go by way of the Suez canal.

The limits imposed on cheap freight traffic from Europe to Asia are: (1) the tolls through the Suez canal; (2) the size of ships that can pass the Suez canal; (3) the cost of coal along the route; (4) the distance. Tolls may be established, but this is not likely; it will take years to deepen the canal, even if this project should be advocated; the cost of coal along the route, as well as the distance, will always be a drawback. The only limit to the size of ships that can be put on the Atlantic is the depths of the harbors on both sides. This limit does not exist in the Pacific, where Puget sound has 400 to 500 ft. of water within a cable's length of the shore. There is abundant and cheap coal in Great Britain, on the Atlantic seaboard, on Puget sound, and all along the line of the northern roads, and there are unlimited numbers of empty freight cars west-bound. By building the largest ships in the world, which Mr. Hill is now doing, even though they run under the more expensive American register, by filling the west-bound cars at a rate little more than the cost of handling, he knows that he can turn the export trade with western Asia from its three-hundred-year-old way past India to the direct Pacific sea route past Alaska. Before these new ships were ordered, experts were sent to Scotland, Ireland and Germany, to absorb all that could be learned of modern mammoth ship building; and to escape from all hampering traditions of the past, an entirely new company, the Eastern Ship Building Co., was formed to construct them and took the contract before even the site was purchased on which



the new yards were to be established. These steamers are 630 ft long, 73 ft. wide, and on draught of 36.5 ft. will have displacement of 37,000 tons. The navigating deck is 90 ft. above the keel. Each steamer can carry 1,200 troops, and the cargo capacity exceeds 20,000 tons. Some of the hatches are large enough to admit a complete locomotive. With a horse-power of 11,000 a speed of 14 knots will be maintained. To accommodate these steamers enormous docks and warehouses are being constructed at Seattle, both wharves and warehouses of gigantic size already existing at Tacoma. Cotton baled by the Lowry compress weighs 45 lbs. to 50 lbs. to the cubic foot, and 400 to 500 large freight cars loaded with these bales will furnish cargo for one only such steamer. The total cotton exported in 1900 was 1,500,000 tons, much of it to Europe for direct or manufactured export to the millions of Asia. These have now made a notable beginning in the manufacture of their own cotton cloths, and increasing quantities of American cotton will be sent direct to them.

Before these ships are launched, in connection with the Boston Steamship Co.—which operates the Shawmut and Tremont, twin-screw steamers of 9,600 tons and 15-knot speed, and also the three smaller steamers, Hyades, Pleides and Lyra—the Northern railroads have quoted a rate of \$8 a ton for the transport of government supplies from Chicago to the Philippine islands, of which the railroad share is \$3.75 per ton. Return rates have been quoted on wool from Australia or New Zealand which make it probable that the imports from British Australasia to Boston, New York and Philadelphia will come by the Pacific overland route instead of through Suez.

In the year that has just closed all the customs districts of the United States showed a decline of exports of grain and grain products except the Pacific coast ports, the shipments from Puget Sound increasing 45 per cent.

From an American point of view there is one shadow in this bright light of future American supremacy on the Pacific, and that is the rivalry of the Canadian roads to the north. One of these already in full operation, the Canadian Pacific, runs from ocean to ocean. The other, the Grand Trunk, is now building to Port Simpson, the most northern seaport in British Columbia. Both these roads command rich wheat belts; both of them tap exceedingly rich and very good coal fields; both of them as they approach the Pacific coast pass through timber lands of the same general character as the heavy forests of Washington and Oregon. The Grand Trunk will have six advantages over all its American competitors. It will stretch from Atlantic to Pacific under one management and can make its own through rates, while none of the American roads extends farther than Chicago, and it will further control ocean-steamer connections at both ends; it will be the latest built road, with latest and most consistent equipment: its Pacific terminus, Port Simpson, a magnificent harbor on the Alaskan border, is nearer by 500 miles to Asia than is Puget sound or Vancouver, yet the road itself is as short as any other transcontinental line; it escapes entirely the climb and heavy grades over the Rocky Mountains, which do not extend as far north as its line; its wheat belt extends from Manitoba unbrokenly to a region that is west of Vancouver, a gain in local agricultural lands of nearly 1,000 miles over the American lines, and it will by the location of its terminus monopolize the whole of the enormous and rapidly-growing Alaskan traffic.

Great and serious as this competition will eventually prove, several years must elapse before it is felt, and this respite should be utilized by the American roads to build up local, through and international traffic, so that an ever decreasing freight rate will, through an ever increasing tonnage, augment the total receipts. Also new economies of intensive operation, as yet almost untried in railroading although successful in other modern industries, can at least double the present efficiency and per dollar of fixed charges carry twice as much freight, without lowering wages or adding to cost.

The heavy capitalization and the merger of the northern roads will in the end prove advantageous, not only to them but in far greater degree to all the people of the United States, as it will necessitate the development of every local resource and also bring about a diversion of the world's oriental trade from the Atlantic to the Pacific, from European to American control, and thus quicken into being a thousand industries not yet conceived. To this beneficent stimulus all the country will respond, most of all the younger commonwealths of the Pacific coast, with their flourishing seaboard cities each with its own particular advantage of location and environment.

The Maryland Steel Co., Sparrow's Point, Md., launched last week the Virginia for the Baltimore, Chesapeake & Atlantic Ry. She is to be used on the Pocomoke City route and will be turned over to her owners in May. Her dimensions are: Length, 190 ft.; beam, molded, 34 ft.; depth, molded, 10 ft. 1 in. The engine is of the vertical, surface-condensing beam type with cylinder of 38 in. diameter and 9 ft. stroke of piston, supplied with steam from a "doghouse" boiler, 17 ft. 3 in. wide and 16 ft. long. This company is also building the Missouri and Maine for the Atlantic Transport Line and a sea-going tug for the New York, Philadelphia & Norfolk Ry.

#### CLAYTON FIRE EXTINGUISHER FOR SHIPS.

Under instructions from Secretary Shaw of the treasury department, a committee from the United States board of supervising inspectors of steam vessels, consisting of Messrs. Robert S. Rodie, John W. Oast and James Stone, recently made a very thorough examination of the Clayton Fire Extinguishing Co.'s system, which lays claim to absolute extinction of fire in holds or bunkers of ships no matter what the cargo. This system has several times been referred to in these columns. An extended account was published some time ago of the first practical exhibition made in England. The New York office of the company is at No. 11 Broadway. The tests witnessed a short time ago by the steamboat inspectors were conducted at Greenpoint, N. Y., where two brick buildings, fire-proofed inside and about 18x8½x9 ft. in size, were erected for the purpose. The extinguisher consists of a sulphur furnace, a blower engine and a cooler. The machine is compact in form, weighing less than 2 tons and occupying floor space of a little less than 5x6 ft. It is about 4½ ft. high. From numerous tests reported by the inspectors the following are selected:

Test No. 6.—A regulation bale of cotton, size 5½x2½x2 ft., was experimented with next. A hole was made in the side of the bale about 3 in. in diameter and 15 in. deep. Into this hole was inserted a bar of round iron 11½ in. in length, heated to a white heat. The end of this bar—2 in. of it—was inserted in a pail of cold water and allowed to cool. The hot end was then inserted in the cotton and the aperture was plugged hard with cotton. The bale was then placed in one of the buildings, which was charged with about 9 per cent. of gas. The door was then closed and sealed and allowed to remain, to be opened at a later date.

Test No. 7.—About a pound of tea in a package, and about a dozen pieces of fabrics, made up of silks, cambrics and calicoes, were placed in the same building and subjected to the same test as the cotton. Two pieces of boiler steel were also subjected to this test. After a sixty-seven hour test under gas, the building was opened in our presence and the cotton bale, fabrics and the tea were examined. The cotton bale was opened thereby exposing the interior of the bale and the fire found to be completely extinguished. The cotton in contact with the hot iron was charred to a depth of about 2 in. and the bale throughout was thoroughly impregnated with gas, the odor of which was very marked, the gas losing its strength very rapidly when exposed to the atmosphere. The tea was found to be practically in the same condition as when placed in the building, after which the tea was steeped and sampled and compared with a portion of the same lot not subjected to the test, and was found to be free from any effects of the gas. The fabrics were found to be uninjured in color or texture. The steel plates showed no sign of corrosive or bad effects by the gases.

The inspectors conclude in their report to the secretary that gases generated by the Clayton system will extinguish fire in a practically air-tight compartment; that a general cargo would not be damaged to any great extent by the use of these gases, and that the gases can be quickly generated and applied when the system is properly installed on board a vessel. As compared with steam, required by law, the inspectors are of the opinion that the gases are more efficient for extinguishing a fire in the hold of a vessel, and with less damage to cargo. Representatives of the Clayton system do not claim any merit for their system when applied in the open air.

#### NAVAL OIL FUEL TEST.

In Washington, a few days ago, and with representatives of several of the large ship building concerns present, the board of naval officers which has been experimenting with crude oil as marine fuel conducted a highly satisfactory test under practically the same trying conditions which would prevail on a battleship in time of action. The experimental plant is similar to the engine room of cruisers of the Denver class. Beaumont oil was used, and it was clearly demonstrated that under a forced draft, ranging between 3 and 4 in. for a continuous period of four hours, the oil gave a greater evaporative effect than coal, which was experimented with a year ago and the results of which are now at hand for comparison. The burner used was a development of the many types of burner which have been submitted to the board. A pressure, approximately 2,000 lbs., was obtained from the boiler, which under natural draft conditions would develop only 800 H. P.

This convinces the experts that the increase in evaporative efficiency under forced draft as compared with natural draft is greater when oil is used than when coal is the fuel. The temperature in the engine rooms was never greater than the crew could easily endure, although the extreme heat generated by the combustion of oil has always been used as an argument against its adoption as fuel.

Howard's ship yard at Jeffersonville, Ind., has secured contracts for the engineer department of the government for two stern-wheel tender steamers, two derrick boats, two scows and six deck barges. They are to be used in the improvement of the Cumberland river.



## ABOUT THE WHEELSMAN.

[From an Occasional Correspondent.]

To steer is one of the most important of the sailor's duties, and something that is readily learned, even by the slowest among them. Being of the opinion that a helmsman becomes careless when compelled to "grind wind and water" for too many consecutive hours, no captains of ocean-going ships, whether believing in the "four on and four off" English watch, the long afternoon watch of the Germans, or the free and easy style of setting watches of the Russians, will ever think of keeping a man at the wheel more than two hours at a time.

Going before the wind, when she requires a little helm incessantly; by the wind, when she is liable to kick; or even when it is blowing an Irish hurricane, the two-hours' trick is in vogue on board of all sea-going vessels. Anyone able to steer by hand is competent to act as helmsman on a boat fitted with steam steering gear, but, there being no strength required to turn the little wheel, giving the ship rather more helm than she needs will be the only trouble experienced at first by the man who never had the aid of steam in his attempts to make a straight wake.

The principle of all steering engines is the same, but there are several types and there are different localities in which they may be placed on the ship to do their monotonous work. They may be seen under or in the pilot house, in the engine room, and even in an after house close to the tiller, thus obviating the use of chains half the length of the boat. An indicator near the wheel shows the position of the helm, and as a rule a bell rings when the helm is hard over.

The helmsmen "par excellence," however, are found on the great lakes, where numerous causes combine to make steering difficult. The pilot houses on lake steamers are well forward, so that the wheelsman is often forced to steer by some object seen over the stern—a trick a salt water man has not learned. Then the shape of the boats, built to carry ocean steamers' freight while drawing only 15 or 18 ft. is certainly conducive to make them show a wake like cats' and dogs' legs. Add to this narrow passages, tortuous channels, strong tides, long tows, and no one can deny that the steering of a lake freighter is no sinecure. That the wheel chains are below decks on lake steamers is, no doubt, for good reasons, among others to prevent their accumulating ice, but the trouble to get at them in case of a break is certainly a disadvantage. As it is the rule for a man to remain cooped up in the pilot house six hours, steadily gazing ahead, or astern, a trip up the Sault river would lose its attractions for many enthusiastic summer tourists had they to control the antics of a wayward lake steamer.

Why the wheel chains on board some lake steamers are

placed reversely around the drum from that of ocean vessels, or even their own schooners and tow barges, has never been satisfactorily explained. It just happened that way is the usual answer. Custom keeps it so. It certainly has its disadvantages. The best of wheelsmen coming from a tow barge or schooner when going to steer one of these arbitrarily-rigged boats are liable to make a mistake by giving the wrong helm. The so-called "crossed chains" steering gear for which nothing can be said in its favor, and that is apt to puzzle any helmsman who is accustomed to a wheel that turns the way the ship's head is expected to go, should be abolished; or have them all with "crossed chains," to please the minority.

## SHORT TRANSATLANTIC ROUTE

All kinds of short routes across the Atlantic have been suggested in English journals since the formation of the Morgan Atlantic combine. Attention is directed anew to the Galway-St. John's route. Commenting on this route, Frank W. Mahin, consul at Nottingham, says: "One of the best natural harbors in the British isles is that of Galway, on the west coast of Ireland. Almost straight across the Atlantic is St. John's Newfoundland. The distance between these two outposts is but 1,816 miles; from Liverpool to New York it is 3,116 miles, and from Southampton 3,095 miles. The time from New York to London could, it is claimed, be easily shortened twenty-four hours by the St. John's-Galway route. It is assumed that transit by land between New York and St. John's would be a material time-saver, while on the British side the railway and steamboat distance from Galway to London is less than from Queenstown, where hurrying passengers are now accustomed to debark or embark. The harbor of Galway is said to be capable of almost indefinite expansion and development, and is protected from Atlantic storms by the Arran islands, which form a natural breakwater across the entrance. The fact that mails could be interchanged a day quicker each way than now is considered a very strong argument in favor of this route."

Capt. George H. Ford died at his home in Ashtabula last Wednesday after an illness of a month's duration, following a decline of some years. He was a native of Batavia, N. Y., but came to the lakes in his youth and began sailing. For some years past, however, he had not been actively associated with the great lakes trade but entered mercantile business in Ashtabula.

The installation of a new coal dock on the Lake Shore side of the harbor at Ashtabula will, it is expected, greatly increase the capacity of the coal handling facilities at Ashtabula.

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English Royal Navy	-	-	-	-	-	-	-	-	849,300	"
Russian Imperial Navy	-	-	-	-	-	-	-	-	193,900	"
Japanese Imperial Navy	-	-	-	-	-	-	-	-	122,700	"
Austrian Imperial Navy	-	-	-	-	-	-	-	-	32,900	"
Italian Royal Navy	-	-	-	-	-	-	-	-	13,500	"
Chilian Navy	-	-	-	-	-	-	-	-	26,500	"
Argentine Navy	-	-	-	-	-	-	-	-	13,000	"
The "Messageries Maritimes" Company	-	-	-	-	-	-	-	-	87,600	"
Chemins de fer de l'Ouest: (The French Western Railway Co.)	-	-	-	-	-	-	-	-	18,500	"
plying between Dieppe and Newhaven	-	-	-	-	-	-	-	-		
Total Horse Power of Boilers <u>in Use</u>	-	-	-	-	-	-	-	-	1,634,360	

WORKS: Ateliers et Chantiers de l'Ermitage, at Saint-Denis (Seine), France.

TELEGRAPHIC ADDRESS: Belleville, Saint-Denis-Sur-Seine.



## SOUND ARGUMENT FROM SECRETARY SHAW.

Secretary of the Treasury Shaw ejected some sound ship subsidy argument into an address which he delivered a few evenings ago at the first annual banquet of the New Orleans board of trade. He said:

"I am going to suggest one more opportunity for non-partisan American statesmanship that would be of great advantage not only to New Orleans, but to the gulf states generally. In forty years the foreign commerce of the United States has increased 400 per cent., but foreign commerce in American bottoms has decreased 65 per cent. In other words, we now have four times as many tons of freight to carry across the seas as we had forty years ago, but we actually carry in American bottoms only a third as many tons as we carried forty years ago. We get about 10 per cent. of the commerce of South America, and we carry only 10 per cent. of that 10. per cent. in our own ships.

"Our farms produce more than the farms of any other country in the world; we mine more coal and more iron than any other people; we grow three-fourths of the cotton of the world, and we manufacture more than all the shops and all the factories of any other two countries on the map, by more than \$3,000,000,000. We transport all of this from port to port along our coast, under our flag and in our own ships, and more cheaply than any other country. We carry it over our railroads at one-third of what it costs in other countries, but when we have produced it and transported it to our shores we have reached our limit and are compelled to cry aloud for help. So we ask England and Germany and France and Italy and Spain and Japan to come and help us, and they respond most willingly, but we pay them for this service \$200,000,000 per annum.

"I am not advocating any particular ship subsidy measure and if I had a vote it would be against any bill that did not make as a condition precedent to any governmental aid the establishment of regular steamship communication with South American or South African countries and adjacent islands or the countries washed by the Pacific ocean. If we shall ever increase our trade with countries lying to the south of us or with those washed by the Pacific ocean, the gulf states will be benefited thereby certainly as much as any portion of our common country. If steamship communication with those countries shall ever be established, ship yards are as likely to be built on the gulf as on the Atlantic coast, and their supply and coaling stations are more likely to be here than elsewhere. If additional cotton factories are built they are likely to be erected where fuel, lumber, iron and labor are abundant and where the material is produced at their very doors."

## WORK AT NEW YORK COMPANY'S YARD.

Camden, N. J., March, 24.—Material is being received at the works of the New York Ship Building Co. for the two large hydraulic dredges recently contracted for and their construction will be started as soon as possible. Work is being rapidly pushed on the fireboat building for the city of New York and it is expected that she will be ready for launching before the time originally set.

The additional wings to the main building are being pushed, as the room is greatly needed. More draughtsmen are being put on daily and the force will grow larger as the work of getting out the drawings for the cruiser Washington progresses. When the main office was built accommodations were provided for 150 men and this was thought ample. There are now 230 employed. A year ago the company employed 2,300 men. Today it is employing 4,200.

The Atlantic Transport liner Mississippi, launched in December, is to undergo her dock trial in a few days.

## SHIP YARD NOTES.

It is expected that the first of the Great Northern liners building at the works of the Eastern Ship Building Co., New London, Conn., will be launched next month.

A three-masted wooden schooner, the William Booth, was launched from the ship yard of M. B. McDonald, Mystic, Conn., last week. Her dimensions are: Length over all, 175 ft.; keel, 146 ft.; beam, 35 ft.; depth, 12 ft.

The Pusey & Jones Co., Wilmington, Del., has received the contract for a fine steel-hull towboat for service on the Delaware river. Dimensions are: Length, 70 ft.; beam, 18 ft.; depth, 7 ft. 6 in. She will have three watertight bulkheads. Engines will be fore-and-aft compound, surface-condensing, with cylinders of 12 and 14 in. diameter, and 18 in. stroke. The boiler will be of the Scotch type, 9 ft. 6 in. in diameter and 10 ft. long.

## ITEMS OF GENERAL INTEREST.

A dividend of 4 per cent. has been declared by the Cunard Steamship Co.

An order has just been given for Belleville water-tube boiler equipment for the French battleship *Liberte* of 18,000 H. P. Twenty-two generators are to be installed.

A dispatch from the Atlantic Works, East Boston, announces that the sale by United States marshal of the tug *Carbonero* at that place has been postponed until Saturday, Mar. 28 at 12 noon.

The Cramps of Philadelphia have negotiated a loan of \$20,000,000 to run through twenty years. With this sum the present floating debt of the company will be retired and \$1,500,000 added to the working capital.

The United States Steel Corporation denies that it is intending to purchase the plants of the Jones & Laughlins Co. The newspapers have purchased this magnificent property several times for the Steel Corporation.

The Beaver Line steamers, recently purchased by the Canadian Pacific Railway, will run between London and Montreal, the new owners have abandoned the plans for a Glasgow-Canada service which it was announced was to be started in April.

It is announced that the trial trip of the monitor *Nevada*, completed last week, was most successful. The vessel made 12.44 knots, 1 knot more than the government required. The *Florida* was built at the Crescent ship yard of the United States Ship Building Co.

Directors of the American Ship Building Co., or rather the executive committee of the directors, have declared the usual quarterly dividend of 1¾ per cent. on the preferred stock. It is payable April 15 to stockholders of record April 4. Books close April 4 and will be reopened April 16.

Mr. Frank J. Firth, president of the Erie & Western Transportation Co. (Anchor Line) officially announces the following appointments: E. T. Evans, vice-president, Atlantic dock, Buffalo; John E. Payne, vice-president, 26 South Fifteenth street, Philadelphia; James C. Evans, western manager, Atlantic dock, Buffalo; Walter Thayer, eastern manager, 26 South Fifteenth street, Philadelphia. Mr. E. T. Evans announces as western manager the following appointments just before undertaking himself the position of vice-president: W. H. Johnson, agent at Chicago, in place of J. C. Evans, appointed western manager; Chas. F. Strasmer, agent at Buffalo in place of W. H. Johnson, transferred to Chicago; A. M. Millard, agent at Milwaukee, in place of D. M. Brigham, resigned.

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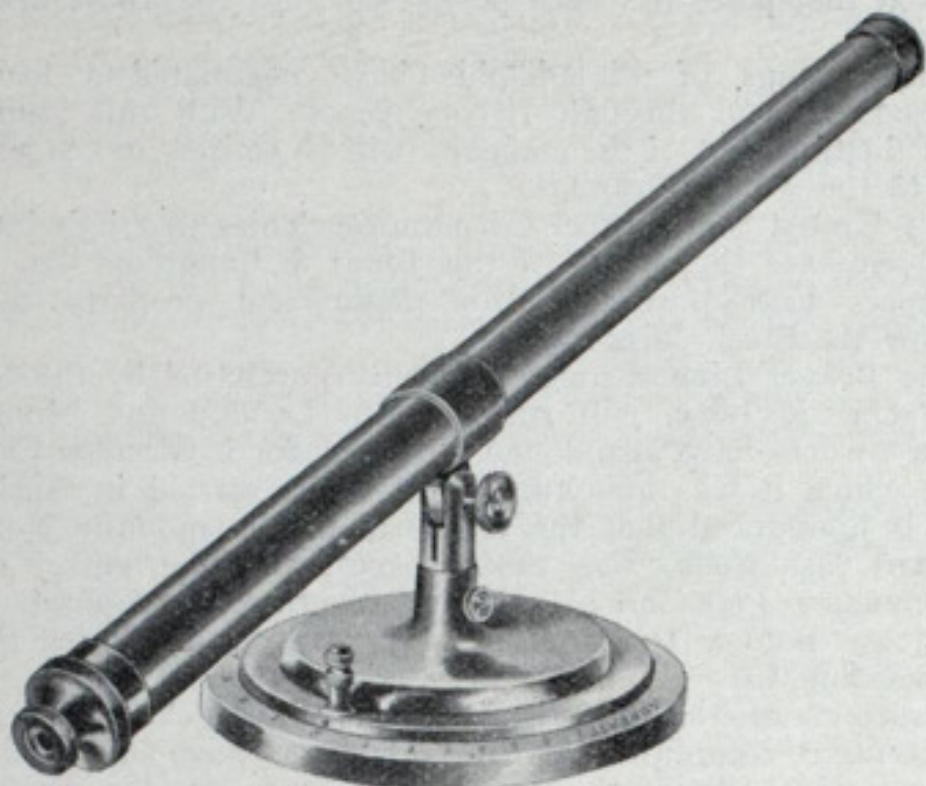
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## DISTANCE OR RANGE FINDER.

The distance or range finder illustrated herewith is a device made by the Nicholson Ship Log Co. of 204 Superior street, Cleveland. No mathematical calculations whatever are required in its operation and there is nothing about it to get out of order. By the use of it may be obtained the distance a vessel will be out from a fixed point or lighthouse when abreast of it, if the same course is held; the distance the vessel must travel before coming



abreast and the distance the vessel is in a straight line from the object at the last observation. It is claimed that all these results are instantly obtained by reading them from a chart provided for the purpose, sometime before coming abreast of the object observed, and that the operation is so simple that anyone can readily learn it.

The apparatus consists of a telescope rotatable on a base, and a chart. The base of the telescope is drilled for eight sights each side of the zero point. These eight sights correspond with the eight radial lines on the chart. Preferably, the base is permanently fastened in a desirable place, and when so fastened the telescope, being set at zero, points in the direction the ship is sailing and parallel to the keel of the ship. When not in use the telescope may be removed from the base by loosening a thumb-screw on the axis and thus kept in a dry place.

A clear explanation of the manner of taking observations is contained in circulars that embody a copy of the chart and which contain also examples to show the working of the device. These circulars, as well as prices, will be furnished upon application to the Nicholson company.

## HYACINTH-MINERVA BOILER TRIALS.

Reports published in this country of the last trial, a few weeks ago, of the British cruiser Hyacinth, fitted with Belleville boilers, and Minerva, equipped with cylindrical boilers, from Plymouth to Gibraltar and return, have been very brief, and have probably caused an unfavorable impression regarding the Belleville boilers, because of the serious accident to the engines of the Hyacinth, which is fitted with the French generators. In a letter just received from Delaunay Belleville & Co., it is stated that the voyage out from Plymouth was performed at 7,000 H. P., the power and consumption for both cruisers being practically the same; that the two ships held the sea at the same speed for 136 consecutive hours and entered Gibraltar together, the Minerva (cylindrical boilers) having her boilers very much soiled and requiring an air pressure of  $1\frac{3}{4}$  in.; that it was 38 hours, also, before the Minerva was ready to resume the journey, while 14 hours sufficed for the Hyacinth, thus putting her twenty-four hours ahead of her rival. On the return trip, which was to be made at full speed, the two cruisers were started together, so as to eliminate the possible influence of the state of the sea. The two ships, keeping in communication with each other by means of the Marconi system, signalled to one another the times of their passing in sight of salient points of the

coast. At Tarifa, the Hyacinth (Belleville boilers) was 35 minutes ahead, near Lisbon 47 minutes, and at the moment when she had to stop, near Cape Finisterre, 52 minutes. It is estimated, then, that without the accident to the engines, the Hyacinth would have arrived at Portsmouth 2 hours before the Minerva.

The cause of the accident is thus stated: Six hours after departure, the axle-bearing of the intermediate port crank began to grow hot. In order not to make the trial of no avail, they continued to run with one axle-bearing half melted, and remained in this state 22 hours. But the violent shocks brought about the breaking of one of the bolts of the head of the connecting rod. Then a second bolt gave way, and then the rod, striking the slide-bar, knocking against the crank, came very near causing a catastrophe. During these 22 hours the horse power was 10,000 and the speed 20 knots, and it is stated that during both runs the Belleville generators of the Hyacinth operated perfectly all the time.

Following is an extract from an article regarding the trial which appeared in the London Daily Graphic: "When the accident occurred the Hyacinth was about forty miles ahead, and had all prospects of success. One of our Plymouth correspondents quotes the officers of the Hyacinth as saying that shortly after the vessels left Gibraltar together Sunday morning at 9 o'clock the Hyacinth took the lead and increased her advantage during the day. Her eighteen Belleville boilers were all in service, at maximum pressure, the power obtained being in the neighborhood of 12,000 H. P. The losses of water were slight. The eight cylindrical boilers of the Minerva generated about 9,000 H. P. During Sunday the mean speed of the Hyacinth was about 21 knots; the Minerva made a whole knot less. Monday, before dawn, the Hyacinth was 50 miles ahead. It was then the cranks of her port engine became hot. Before as well as afterward, a great quantity of oil was used, and water to cool the bearings, but without result, and the danger became so great that Monday morning at 9:15 the engine was stopped, just as the Hyacinth was entering the Bay of Biscay (Gulf of Gascony). During the morning the Minerva came up and continued the trip alone."

Before July 1 it is expected that five vessels now on the stocks at Cramps, Philadelphia, will be in the water. The first to be launched will be the steamer Asbury Park, which is being built for the Central Railroad of New Jersey. She is 306 ft. long, 50 ft. beam, and has a draught of 11 ft. She will have four decks with accommodations for 3,000 passengers. The armored cruiser Colorado will be launched on April 25. She is 502 ft. in length on the load water line, 69 ft. 6 in. beam and 24 ft. 6 in. draught. In May the armored cruiser Pennsylvania, duplicate of the Colorado, will go overboard. It is expected that the Clyde liner, not yet named, will be launched also in May, while the cruiser Medjidia for the Ottoman government will go into the water in June.

Cobb, Butler & Co., Rockland, Me., are to build a wooden steamboat for the Rockland & Vinalhaven Steamboat Co. of the following dimensions: Length, 121 ft.; beam, 26 ft.; depth, 9 ft. 6 in.

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## PACIFIC OCEAN BELIES ITS NAME.

It is well known that the Pacific is not as pacific as its name would imply. Indeed when the first adventurer looked upon it it had a very placid face and he called it Pacific. For centuries it was practically an unsailed ocean and there was really no definite reason for assailing its title. Even up to so recent a date as fifteen years ago the Pacific ocean was practically innocent of commerce. During the past ten years, and especially since the Spanish-American war, it has become an avenue of considerable trade, and those who cross it and re-cross it have reason to doubt the veracity of its title. The Pacific ocean is in fact, subject to terrific storms—storms which reach a higher degree of fury than are known on the Atlantic, though it may be true that they are of rarer occurrence. The ship Celtic Chief, which recently arrived at Sydney with a cargo of wheat from Tacoma, encountered a storm of unusual severity. The barometer fell as low as 28.70 and for hours the ship was in great peril. Heavy seas broke continually over her and she became practically unmanageable. The man at the wheel was washed from his post and it was found absolutely necessary to lash him to the wheel. One of the lifeboats was washed out of the davits and lost overboard, and then a complete set of nineteen sails was blown into ribbons. One sea carried away over 100 ft. of the bulwarks. Several spar spars which were stored on deck were washed overboard. They returned with the succeeding sea and striking the deckhouse with tremendous force shattered the building. The foreroyalmast was carried away and the foretopmast was bent like matchwood. The damages on the deck were extensive and from the foremost down abaft the mainmast everything was smashed to atoms.

## TRADE NOTES.

Mr. Edgar N. Smith, formerly road master on the B. & M. R. Ry., in Nebraska, and previous to that on the N. Y., N. H. & H. and the Boston Elevated, has accepted a position with the Railway Appliances Co. of Chicago and is to give his time particularly to the Q and C-Bonzano rail joint.

The C. W. Hunt Co., West New Brighton, Staten Island, New York, has just issued a little catalogue devoted to its electric storage battery locomotive. A storage battery locomotive is the ideal motive in shops, foundries and manufactories where heavy material is to be moved on cars. Its advantages are, indeed, obvious.

The gasoline yacht Sinner, owned by Thomas H. Webb, Peoria, Ill., has been sold through the agency of Frank N.

Tandy. This yacht was built by Murray & Tregurtha of South Boston in 1903. She is 42 ft. long and is fitted with an engine of 10 H. P. She has a fine cabin forward and a large flush deck aft. The new owner will use the boat for cruising in eastern waters.

"Westinghouse fan motors for alternating and direct current circuits" is the title of a pretty brochure just issued by the Westinghouse Electric & Mfg. Co. of Pittsburg. The new designs embody the latest ideas and the accumulated experience of past years. The recognition of the fan motor as a necessity for comfort during the summer months has made the demand for fans such that manufacturers have been taxed to the utmost. The design of Westinghouse motor has been carefully worked out. The mechanical parts are of a graceful outline and present a pleasing appearance. The iron parts are japanned, and the fan blades, guards and oil cups are of polished brass. Two speeds are obtained by the use of a controlling switch mounted in the base of the motor. This switch is of simple and durable construction and cannot get out of order. The high speed gives force and volume enough to insure ventilation to a large room while the low speeds are best suited for desk fans and consume considerably less energy.

The turbine destroyer Velox has just completed a series of steam trials on the Tyne to determine her acceptance by the admiralty as a 27-knot vessel, but the results were so unsatisfactory that the admiralty require the trials to be repeated. The coal consumption on the full-power trials was considerably in excess of the maximum laid down by the admiralty. On the last full-power trial the mean speed realized was 27.07 knots, and the consumption of coal worked out at 9 tons 16½ cwt. per hour. The steam pressure on the four Yarrow boilers is 200 lbs. per square inch, the vacuum 27 in., revolutions of turbines 840 per minute. A coal consumption trial with the reciprocating engines gave more satisfactory results. These engines are designed to propel the vessel at cruising speeds only, and the trial was of twelve hours' duration at 11 knots with the following results: Steam in boilers, 212 lbs.; vacuum, 28.25 in.; revolutions, 351.4; speed, 11.26 knots; coal consumption, 8.58 cwt. per hour.

A system of wireless telegraphy is to be installed at the New York navy yard. The object is to secure communication with incoming and outgoing vessels for the purpose of transmitting orders which are now dispatched by tugs.

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## Steam Yacht for Sale.

Steam yacht, 30 ft. over all, 7-ft. beam. Fitted for salt water use. Burns kerosene. Is in fine order. Will be sold cheap. J. L. Alberger, 695 Ellicott Square, Buffalo, N. Y. Apr. 30.

## Yacht Engine for Sale.

For Sale—Triple-expansion yacht engine 4½ x 7 x 11; stroke 7¼ inches; about 75 horse power. Address A. C. Harding, 155 Washington street, Chicago, Ill. Mar. 26.

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For particulars apply to Collins Bay Rafting & Forwarding Co., Ltd., Kingston, Ont. June 18.

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U. S. Engineer Office, Grand Rapids, Mich., March 2, 1903. Sealed proposals for repair of south pier at Portage Lake, Mich., and extension and repair of piers at Frankfort, Mich., will be received here until 3 p. m., April 1, 1903, and then publicly opened. Information furnished on application. CHARLES KELLER, Capt., Engrs. Mch. 26

U. S. Engineer Office, Grand Rapids, Mich., Mar. 12, 1903. Sealed proposals for extension of west breakwater at Petoskey, Mich., will be received here until 3 p. m., April 11, 1903, and then publicly opened. Information furnished on application. CHARLES KELLER, Capt. Engrs. Apr. 9.

U. S. Engineer Office, Duluth, Minn., Mar. 12, 1903. Sealed proposals for furnishing 6,000 barrels Portland cement for concrete superstructure to breakwater at Marquette, Mich., will be received here until noon April 11, 1903, and then publicly opened. Information on application. D. D. GAILLARD, Capt., Engrs. Apr. 9.

U. S. Engineer Office, Duluth, Minn., Mar. 25, 1903. Sealed proposals for furnishing 7,000 cu. yds. broken stone and 4,000 cu. yds. sand for Concrete Superstructure to breakwater, Marquette, Mich., will be received here until noon April 24, 1903, and then publicly opened. Information on application. D. D. GAILLARD, Capt., Engrs. April 16.



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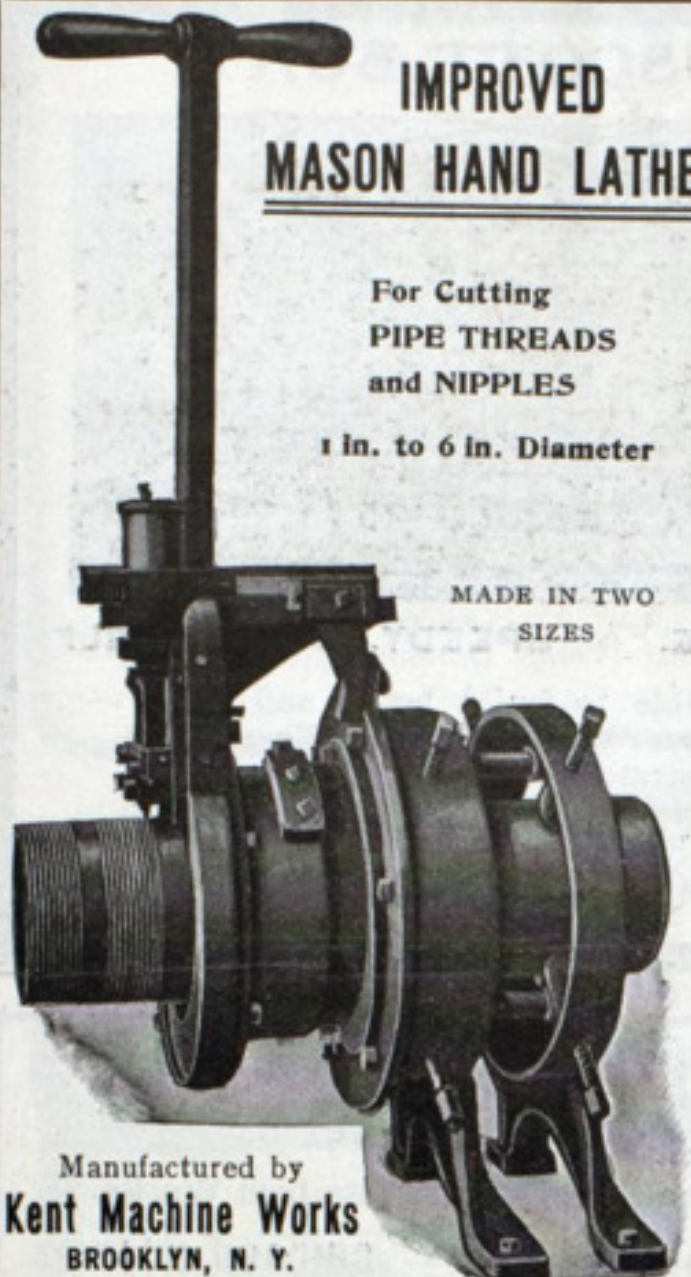


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field, owner, Port Huron, Mich. t f

**Passenger Steamer and Tug  
for Sale.**

Steamer Ogantz, 80 ft. keel, 18 ft. 8 in.  
beam, 7 ft. 6 in. draught. Fore and aft  
compound engine, 14 and 25 by 16 in.  
Scotch boiler, 10 ft. by 84 in., allowed 125  
lbs. steam. Passenger allowance—45 regu-  
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Tug Dan Connelley, 65 ft. keel, 16 ft. 6  
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13½ ft. by 76 in., allowed 90 lbs. steam.  
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These boats were in commission last sea-  
son and are in good condition. Price rea-  
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For Sale—Barge City of Toledo. Owners  
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Co., Cleveland, L. S. Sullivan, Toledo, or  
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where vessel can be seen Apr. 2.

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35, St. Clair, Mich. Mar. 26.

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See accompanying index of Advertisers for full addresses of concerns in this directory.

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Warrington Iron Works.....Chicago.  
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Also Ship Chandlers.

**LUMBER.**

Martin-Barriss Co. ....Cleveland.  
Moran Bros. Co. ....Seattle, Wash.

**MACHINISTS.**

Chase Machine Co. ....Cleveland.  
Macbeth Iron Co. ....Cleveland.  
Union Machine & Boiler Co. ....Cleveland.  
Ward Machine Co. ....Cleveland.

**MACHINE TOOLS (WOOD WORKING).**

Atlantic Works, Inc. ....Philadelphia.

**MACHINERY, NEW AND SECOND HAND.**

Bowler & Co. Geo. H. ....Cleveland.  
Clyde Machine Works. ....Chicago.

**MAN-HOLES, SWING DOORS, ETC.**

"Long-Arm" System Co. ....Cleveland.

**MARINE RAILWAYS, BUILDERS OF**

Crandall & Son, H. I. ....East Boston, Mass.

**MATTRESSES, CUSHIONS, BEDDING.**

Fogg, M. W. ....New York.

**MECHANICAL DRAFT FOR BOILERS.**

American Ship Building Co. ....Cleveland.  
Bloomsburg & Co., H. ....Baltimore, Md.  
Buffalo Forge Co. ....Buffalo.  
Detroit Ship Building Co. ....Detroit.  
Sturtevant, B. F. Co. ....Boston.

**METALLIC PACKING.**

American Metallic Packing Co. ....Cleveland.  
Hayden Mfg. Co., N. L. ....Columbus, O.  
Katzenstein, L. & Co. ....New York.  
U. S. Metallic Packing Co. ....Philadelphia.

**METAL POLISH.**

Bertram's Oil Polish Co. ....Boston.

**MOTORS, GENERATORS—ELECTRIC.**

Buffalo Forge Co. ....Buffalo.  
Electro-Dynamic Co. ....Philadelphia.  
Elwell-Parker Electric Co. ....Cleveland.  
General Electric Co. ....Schenectady, N. Y.  
"Long-Arm" System Co. ....Cleveland.  
Seldler-Miner Electric Co. ....Detroit.  
Sturtevant, B. F. Co. ....Boston.  
United Marine Mfg. & Supply Co. ....New York.  
Westinghouse Electric & Mfg. Co. ....Pittsburg, Pa.

**NAUTICAL INSTRUMENTS.**

Bliss, John & Co. ....New York.  
Ritchie, E. S. & Sons .....Brookline, Mass.

**NAVAL ARCHITECTS.**

Gaskin, Edward .....Buffalo.  
Kidd, Joseph .....Duluth, Minn.  
Logan, Robert .....Cleveland.  
Mosher, Chas. D. ....New York.  
Newman, R. L. ....New York.  
Sadler, Perkins & Field. ....New York.  
See, Horace .....New York.  
Wood, W. J. ....Chicago.

**OAKUM.**

DeGrauw, Aymar & Co. ....New York.  
Stratford Oakum Co. ....Jersey City, N. J.

**OILS AND LUBRICANTS.**

Dixon Crucible Co., Joseph .....Jersey City, N. J.  
Standard Oil Co. ....Cleveland.

**PACKING.**

American Metallic Packing Co. ....Cleveland.  
American Steam Packing Co. ....Boston.  
Crane Co. ....Chicago.  
Hayden Mfg. Co., N. L. ....Columbus, O.  
Jenkins Bros. ....New York.  
Katzenstein, L. & Co. ....New York.  
New York Belting & Packing Co. ....New York.  
United States Metallic Packing Co. ....Philadelphia.

**PAINTS.**

Baker, Howard H. & Co. ....Buffalo.  
Berry Bros., Ltd. ....Detroit.  
Mohawk Paint & Chemical Co. ....New York.  
New Jersey Zinc Co. ....New York.  
Topky Brothers .....Ashtabula, O.  
Upson-Walton Co. ....Cleveland.

**PATENT ATTORNEYS.**

Thurston & Bates .....Cleveland.

**PATTERN SHOP MACHINERY.**

Atlantic Works, Inc. ....Philadelphia.

**PIPE—BRASS AND COPPER, IRON PIPE SIZE.**

Waterbury Brass Co. ....New York.

**PIPE, WROUGHT IRON.**

Bourne-Fuller Co. ....Cleveland.  
Crane Co. ....Chicago.  
Macbeth Iron Co. ....Cleveland.

**PLANING MILL MACHINERY.**

Atlantic Works, Inc. ....Philadelphia.

**PLATE BENDING AND PLANING MACHINES.**

Wood & Co., R. D. ....Philadelphia.

**PLUMBING, MARINE.**

Mott, J. L., Iron Works .....New York.  
Reilly Repair & Supply Co., James. ....New York.  
Sands, Alfred B. & Son .....New York.

**PNEUMATIC TOOLS.**

Allen, John F., .....New York.  
Chicago Pneumatic Tool Co. ....Chicago.  
Railway Appliances Co. ....Chicago.

**POLISH FOR METALS.**

Bertram's Oil Polish Co. ....Boston.

**POWER DOORS AND HATCHES.**

"Long-Arm" System Co. ....Cleveland.

**PRESSURE REGULATORS.**

Kieley & Mueller .....New York.  
Ross Valve Co. ....Troy, N. Y.



## BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

## PROPELLER WHEELS.

American Ship Building Co. .... Cleveland  
 Atlantic Works ..... East Boston, Mass.  
 Baltimore Ship Building & Dry Dock Co. .... Baltimore.  
 Bath Iron Works, Ltd. .... Bath, Me.  
 Cramp, Wm. & Sons ..... Philadelphia.  
 Detroit Ship Building Co. .... Detroit.  
 Fore River Ship & Engine Co. .... Quincy, Mass.  
 Great Lakes Engineering Works ..... Detroit.  
 Hyde Windlass Co. .... Bath, Me.  
 Jenks Ship Building Co. .... Port Huron, Mich.  
 Lockwood Mfg. Co. .... East Boston, Mass.  
 Macbeth Iron Co. .... Cleveland.  
 MacKinnon Mfg. Co. .... Bay City, Mich.  
 Maryland Steel Co. .... Sparrow's Point, Md.  
 Milwaukee Dry Dock Co. .... Milwaukee.  
 Moran Bros. Co. .... Seattle, Wash.  
 Neale & Levy Ship & Engine Bldg. Co. .... Phila.  
 Newport News Ship Bldg. Co. .... Newport News, Va.  
 Nixon, Lewis ..... Elizabeth, N. J.  
 Phosphor Bronze Smelting Co., Ltd. .... Philadelphia.  
 Pusey & Jones Co. .... Wilmington, Del.  
 Risdon Iron Works ..... San Francisco.  
 Roelker, H. B. .... New York.  
 Sheriffs Mfg. Co. .... Milwaukee.  
 Superior Ship Building Co. .... Superior, Wis.  
 Thropp & Sons Co., J. E. .... Trenton, N. J.  
 Trigg, Wm. R. Co. .... Richmond, Va.  
 Trout, H. G. .... Buffalo.

## PROJECTORS, ELECTRIC.

Elwell-Parker Electric Co. .... Cleveland.  
 General Electric Co. .... Schenectady, N. Y.  
 Seldler-Miner Electric Co. .... Detroit.  
 Westinghouse Electric & Mfg. Co. .... Pittsburg, Pa.

## PUMPS FOR VARIOUS PURPOSES.

Blake, Geo. F. Mfg. Co. .... New York.  
 Clyde Machine Works ..... Chicago.  
 Great Lakes Engineering Works ..... Detroit.  
 Kingsford Foundry & Machine Wks. .... Oswego, N. Y.  
 Long Arm System Co. .... Cleveland.

## PUNCHES, RIVETERS, SHEARS.

Chicago Pneumatic Tool Co. .... Chicago.

## REFRIGERATING APPARATUS.

Roelker, H. B. .... New York.

## REGISTER FOR CLASSIFICATION OF VESSELS.

Great Lakes Register ..... Cleveland.  
 Record of American & Foreign Shipping. .... New York.

## RELEASING HOOKS FOR DETACHING BOATS.

Standard Automatic Releasing Hook Co. .... New York.

## RIVETS, STEEL, FOR SHIPS AND BOILERS.

Bourne-Fuller Co. .... Cleveland.

## RANGES.

Russell & Watson ..... Buffalo.

## RIVETS—BRASS AND COPPER.

Waterbury Brass Co. .... New York.

## RUBBER INSULATED WIRES.

Roebbing's Sons, Jno. A. .... New York and Cleveland.

## SAFETY VALVES.

American Steam Gauge Co. .... Boston.  
 Ashton Valve Co. .... Boston.  
 Hayden Mfg. Co., N. L. .... Columbus, O.  
 Lunkenheimer Co. .... Cincinnati.

## SAIL MAKERS.

Baker, Howard H. & Co. .... Buffalo.  
 Upson-Walton Co. .... Cleveland.  
 Wilson & Silsby ..... Boston.

## SALVAGE COMPANIES.

See Wrecking Companies.

## SCHOOLS—NAUTICAL, ENGINEERING.

Chicago Nautical School ..... Chicago.

## SEARCH LIGHTS.

Elwell-Parker Electric Co. .... Cleveland.  
 General Electric Co. .... Schenectady, N. Y.  
 Seldler-Miner Electric Co. .... Detroit.  
 Westinghouse Electric & Mfg. Co. .... Pittsburg, Pa.

## SHEARS.

See Punches, Rivets, and Shears.

## SHIP AND BOILER PLATES AND SHAPES.

Bourne-Fuller Co. .... Cleveland.

## SHIP BUILDERS.

American Ship Building Co. .... Cleveland.  
 Atlantic Works ..... East Boston, Mass.  
 Baltimore Ship Building & Dry Dock Co. .... Baltimore.  
 Bath Iron Works, Ltd. .... Bath, Me.  
 Buffalo Dry Dock Co. .... Buffalo.  
 Columbia Iron Works ..... Port Huron.  
 Cramp, Wm. & Sons ..... Philadelphia.

Craig Ship Building Co. .... Toledo, O.  
 Chicago Ship Building Co. .... Chicago.  
 Detroit Ship Building Co. .... Detroit.  
 Fore River Ship & Engine Co. .... Quincy, Mass.  
 Great Lakes Engineering Works ..... Detroit.  
 Jenks Ship Building Co. .... Port Huron, Mich.  
 Lockwood Mfg. Co. .... East Boston, Mass.  
 Manitowoc Dry Dock Co. .... Manitowoc, Wis.  
 Marine Construction & Dry Dock Co. ....  
 .... Mariner's Harbor, S. I., N. Y.  
 Maryland Steel Co. .... Sparrow's Point, Md.  
 Milwaukee Dry Dock Co. .... Milwaukee.  
 Moran Bros. Co. .... Seattle, Wash.  
 Neale & Levy Ship & Engine Bldg. Co. .... Phila.  
 Newport News Ship Bldg. Co. .... Newport News, Va.  
 Nixon, Lewis ..... Elizabeth, N. J.  
 Pusey & Jones Co. .... Wilmington, Del.  
 Risdon Iron Works ..... San Francisco.  
 Roach's Ship Yard ..... Chester, Pa.  
 Smith & Son, Abram ..... Algonac, Mich.  
 Trigg, Wm. R. Co. .... Richmond, Va.  
 Warrington Iron Works ..... Chicago.  
 Willard, Chas. P. & Co. .... Chicago.

## SHIP CHANDLERS.

Baker, Howard H. & Co. .... Buffalo.  
 Moran Bros. Co. .... Seattle, Wash.  
 Relly Repair & Supply Co., James. .... New York.  
 Upson-Walton Co. .... Cleveland.

## SHIP LANTERNS AND LAMPS.

Helvig, H. A. J. .... New York.  
 Page Bros. & Co. .... New York.  
 Russell & Watson ..... Buffalo.

## SMOOTH-ON COMPOUND, FOR REPAIRS.

Smooth-On Mfg. Co. .... Jersey City, N. J.

## SPARS—LARGE SIZES.

Moran Bros. Co. .... Seattle, Wash.

## STAYBOLTS, IRON OR STEEL, HOLLOW, OR SOLID.

Falls Hollow Staybolt Co. .... Cuyahoga Falls, O.

## STEAM VESSELS FOR SALE.

Elwell, Jas. W. & Co. .... New York.  
 Holmes, Samuel ..... New York.  
 King, Rufus S. .... New York.  
 McCarthy, T. R. .... Montreal, Can.  
 Newman, R. L. .... New York.  
 Weeks, F. H. .... New York.

## STEAMSHIP LINES, PASS. AND FREIGHT.

American Line ..... New York.  
 Erie & Western Trans. Co. .... Buffalo.  
 International Nav. Co. .... Philadelphia.  
 Pere Marquette R. R. & S. S. Line. .... Milwaukee.  
 Red Star Line ..... New York.

## STEEL CASTINGS.

Seaboard Steel Casting Co. .... Chester, Pa.  
 Macbeth Iron Co. .... Cleveland.

## STEERING APPARATUS.

American Ship Building Co. .... Cleveland.  
 Chase Machine Co. .... Cleveland.  
 Dake Engine Co. .... Grand Haven, Mich.  
 Detroit Shipbuilding Co. .... Detroit.  
 Electro-Dynamic Co. .... Philadelphia.  
 Hyde Windlass Co. .... Bath, Me.  
 Jenks Ship Building Co. .... Port Huron, Mich.  
 Queen City Engineering Co. .... Buffalo.  
 Sheriff Mngf. Co. .... Milwaukee.

## STOCKS, BONDS, SECURITIES.

Brown, W. W. .... Cleveland.  
 Fahey & Co. .... Cleveland.

## SUBMARINE DIVING APPARATUS

Morse & Son, A. J. .... Boston.  
 Schrader's Son, A. .... New York.

## SURVEYORS, MARINE.

Gaskin, Edward ..... Buffalo.  
 Newman, R. L. .... New York.  
 See, Horace ..... New York.  
 Wood, W. J. .... Chicago.

## TESTS OF MATERIAL.

Hunt, Robert W. & Co. .... Chicago.  
 Pittsburg Testing Laboratory, Ltd. .... Pittsburg.

## TILING, INTERLOCKING RUBBER.

New York Belting & Packing Co. .... New York.

## TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Allen, John F. .... New York.  
 Chicago Pneumatic Tool Co. .... Chicago.  
 Railway Appliances Co. .... Chicago.  
 Watson-Stillman Co. .... New York.

## TOOLS, WOOD WORKING.

Atlantic Works, Inc. .... Philadelphia.

## TOWING MACHINES.

American Ship Windlass Co. .... Providence, R. I.  
 Chase Machine Co. .... Cleveland.

## TOWING COMPANIES.

Donnelly Salvage & Wrecking Co. .... Kingston, Ont.  
 Midland Towing & Wrecking Co., Ltd. .... Midland, Ont.

## TRAPS, STEAM.

Kieley & Mueller ..... New York.

## TRUCKS.

Boston & Lockport Block Co. .... Boston.

## TUBING, SEAMLESS.

National Tube Co. .... Pittsburg.  
 Waterbury Brass Co. .... New York.

## VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co. .... Boston.  
 Ashton Valve Co. .... Boston.  
 Crane Co. .... Chicago.  
 Farnan Brass Works ..... Cleveland.  
 Hayden Mfg. Co., N. L. .... Columbus, O.  
 Jenkins Bros. .... New York.  
 Kieley & Mueller ..... New York.  
 Lunkenheimer Co. .... Cincinnati.  
 Ross Valve Co. .... Troy, N. Y.

## VALVES FOR WATER AND GAS.

Wood & Co., R. D. .... Philadelphia.  
 Ross Valve Co. .... Troy, N. Y.

## VARNISHES.

Berry Brothers, Ltd. .... Detroit.  
 New Jersey Zinc Co. .... New York.  
 Also Ship Chandlers.

## VESSEL CASTINGS.

American Ship Building Co. .... Cleveland.  
 Macbeth Iron Co. .... Cleveland.

## VESSEL FURNISHINGS.

Williams & Rodgers Co., The. .... Cleveland

## VESSEL AND FREIGHT AGENTS.

Boland, John J. .... Buffalo.  
 Brown & Co. .... Buffalo.  
 Brown, W. W. .... Cleveland.  
 Dunham, R. J. .... Chicago.  
 Elwell, Jas. W. & Co. .... New York.  
 Elphicke, C. W. & Co. .... Chicago.  
 Fleming & Co., P. H. .... Chicago.  
 Hall & Root ..... Buffalo.  
 Helm & Co., D. T. .... Duluth.  
 Hawgood & Co., W. A. .... Cleveland.  
 Holmes, Samuel ..... New York.  
 Hutchinson & Co. .... Cleveland.  
 King, Rufus S. .... New York.  
 McCarthy, T. R. .... Montreal.  
 Newman, R. L. .... New York.  
 Mitchell & Co. .... Cleveland.  
 Richardson, W. C. .... Cleveland.  
 Sullivan, D. & Co. .... Chicago.  
 Weeks, F. H. .... New York.

## VENTILATING APPARATUS FOR SHIPS.

Buffalo Forge Co. .... Buffalo.  
 Sturtevant, B. F. Co. .... Boston.

## WIRE—BRASS AND COPPER.

Waterbury Brass Co. .... New York.

## WIRE ROPE AND WIRE ROPE FITTINGS.

Baker, H. H. & Co. .... Buffalo.  
 DeGrauw, Aymar & Co. .... New York.  
 Upson-Walton Co. .... Cleveland.

## WHISTLES, STEAM.

American Steam Gauge Co. .... Boston.  
 Ashton Valve Co. .... Boston.  
 Farnan Brass Works ..... Cleveland.  
 Lunkenheimer Co. .... Cincinnati.

## WHITE METAL—SHEETS, RODS AND WIRE.

Waterbury Brass Co. .... New York.

## WINDLASSES.

American Ship Windlass Co. .... Providence, R. I.  
 American Ship Building Co. .... Cleveland.  
 Hyde Windlass Co. .... Bath, Me.  
 Jenks Ship Building Co. .... Port Huron, Mich.

## WINCHES.

American Ship Windlass Co. .... Providence, R. I.  
 Hyde Windlass Co. .... Bath, Me.

## WOOD WORKING MACHINERY.

Atlantic Works, Inc. .... Philadelphia.

## WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co. .... Kingston, Ont.  
 Midland Towing & Wrecking Co., Ltd. .... Midland, Ont.

## YACHT AND BOAT BUILDERS.

Dreln, Thos. & Son. .... Wilmington, Del.  
 Lane & DeGroot ..... Long Island City, N. Y.  
 Marine Construction & Dry Dock Co. .... New York.  
 Truscott Boat Mfg. Co. .... St. Joseph, Mich.  
 Warrington Iron Works ..... Chicago.  
 Willard, Chas. P. & Co. .... Chicago.

## YAWLS.

Dreln, Thos. & Son. .... Wilmington, Del.  
 Lane & DeGroot ..... Long Island City, N. Y.



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## PERE MARQUETTE R.R. & STEAMSHIP LINE

Chicago, Milwaukee, Manitowoc,  
and Grand Rapids, Saginaw,  
Port Huron, Detroit, Toledo

H. F. MOELLER, Gen'l Passenger Agent  
Send for folder. DETROIT, MICH

## The Erie & West. Transportation Co.

### ANCHOR LINE.

#### PASSENGER SERVICE Steamers.

India.	China.	Japan.
Buffalo.	Erie.	Cleveland.
Detroit.		Mackinac Island.
Sault Ste. Marie.	Marquette.	Houghton.
Hancock.	Duluth.	

#### FREIGHT SERVICE Steamers.

Alaska.	Codorus.	Mahoning.
Schuylkill.	Conestoga	Clarion.
Delaware.	Juniata.	Lehigh.
Lycoming.	Susquehanna.	Wissahickon.
Conemaugh.		

### PORTS OF CALL.

Buffalo.	Erie.	Cleveland.
Detroit.	Sault Ste. Marie.	Marquette.
Houghton.	Hancock.	Duluth.
W. Superior	Chicago.	Milwaukee.

CHAS. E. MARKHAM, E. T. EVANS,  
General Passenger Agent, Western Manager,  
Buffalo, N. Y. Buffalo, N. Y.

## LAKE SHORE & MICHIGAN SOUTHERN RY.

### Eastward.

No. 18, Southwestern Lim	Arrive	Depart
No. 22, Lake Shore Lim...	from	West
No. 20, Chi & Cleve Ex...	2:15am	2:20am
No. 28, N Y & Bost Ex...	7:20am	7:25am
No. 40, Toledo & Buff Ac.	7:40am	8:00am
No. 32, Fast Mail	10:00am	10:40am
No. 44, Ac via Sandusky...	11:25am	11:30am
No. 46, Southwestern Ex.	11:40pm	
No. 106, Conneaut Accom		3:00pm
No. 6, Lim Fast Mail...		4:30pm
No. 26, 20th Cent L.m....	5:40pm	5:45pm
No. 10, C., N Y & B Sp...	7:40pm	7:43pm
No. 16, New Eng Ex.....	7:30pm	7:50pm
No. 2, Day Express.....	10:30pm	10:35pm
No. 126, Norwalk Accom.	10:10pm	10:25pm
	17:50am	

### Westward.

No. 11, Southwestern Lim	Arrive	Depart
No. 7, Day Express.....	from	East
No. 15, Bost & Chi Sp....	3:25am	3:30am
No. 19, Lake Shore Lim...	3:10am	3:15am
No. 23, Western Express...	7:15am	7:20am
No. 33, Southern Express	10:30am	10:35am
No. 133, Cleve & Det Ex...	12:25pm	
No. 47, Accommodation...		12:45pm
No. 141, Sandusky Accom.	11:20am	11:30pm
No. 43, Fast Mail	4:35pm	4:40pm
No. 127, Norwalk Accom...		5:10pm
No. 37, Pacific Express...	7:00pm	7:20pm
No. 3, Fast Mail Lim.....	10:30pm	10:35pm
No. 115, Conneaut Accom.	8:30am	

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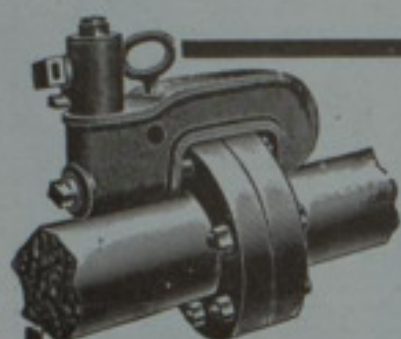
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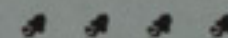
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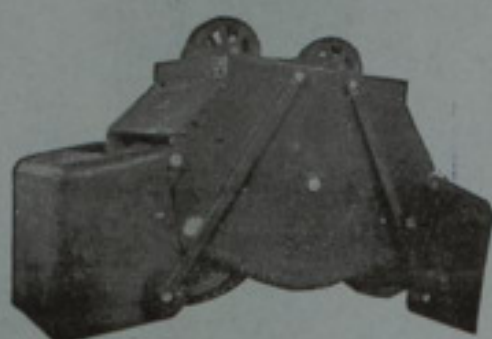
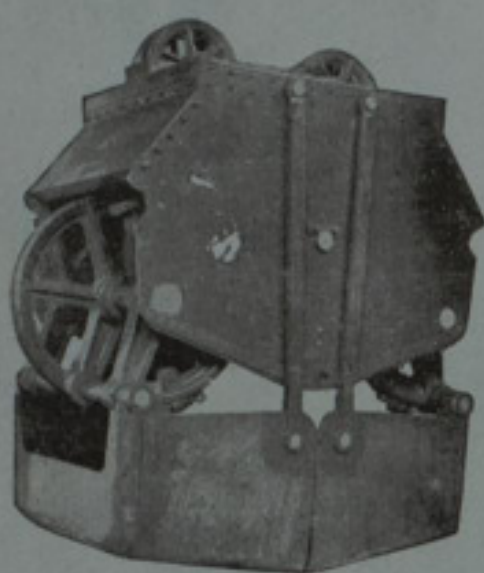
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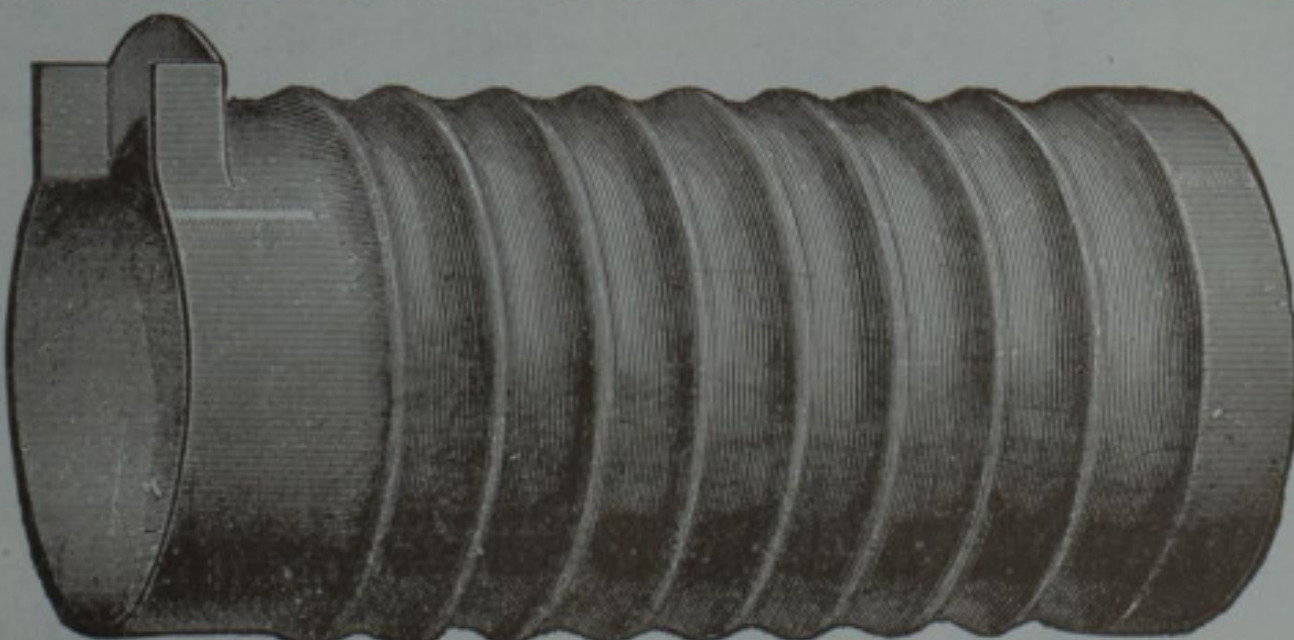
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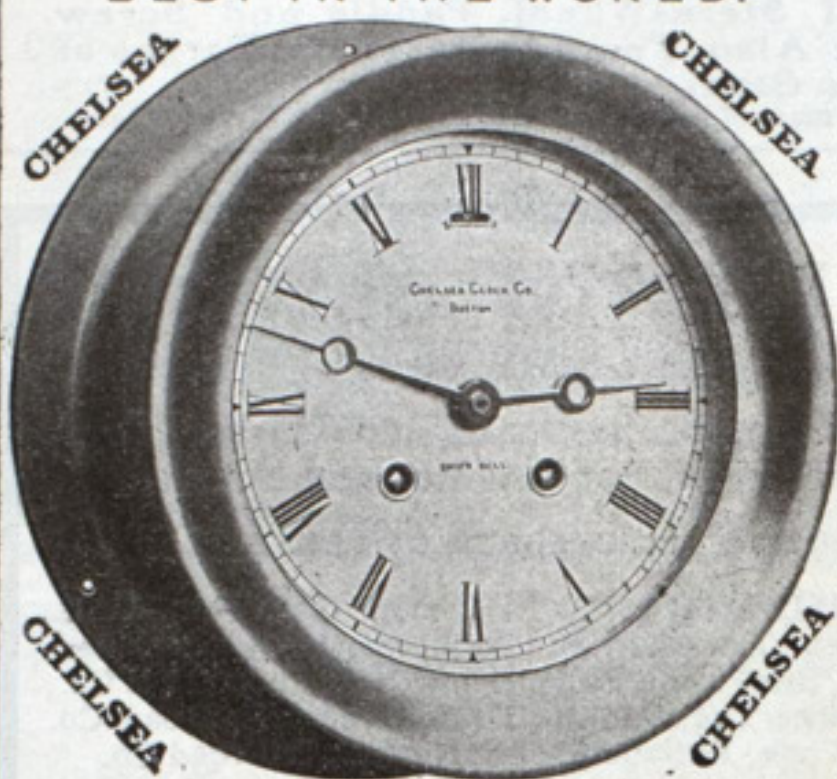
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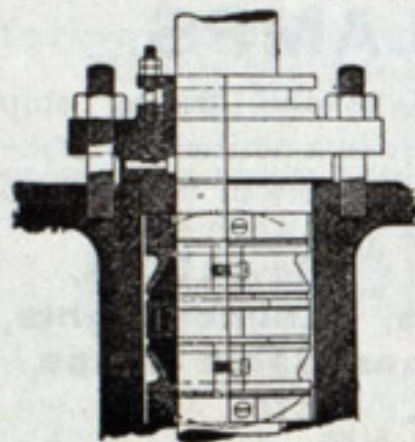
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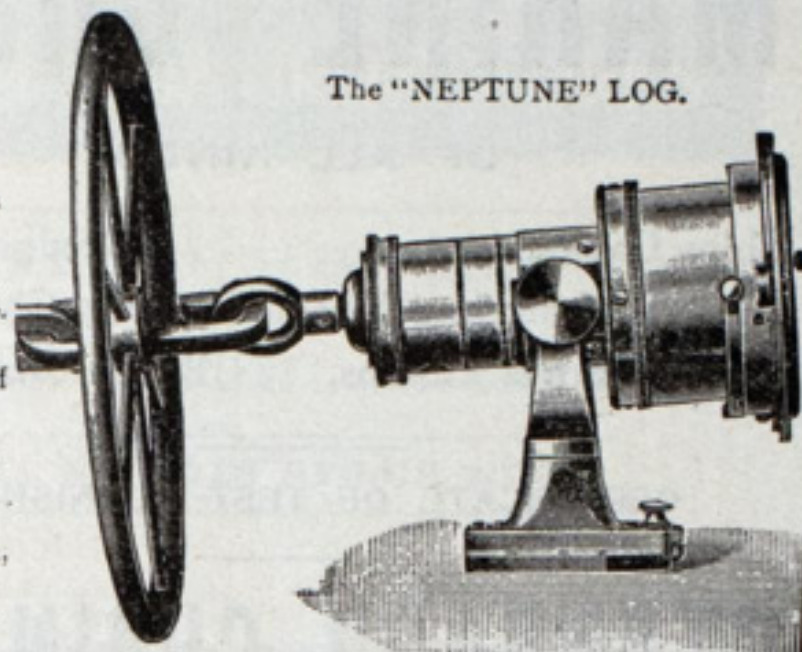
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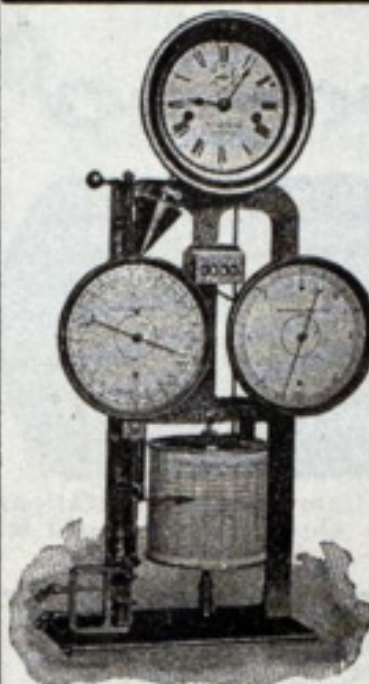
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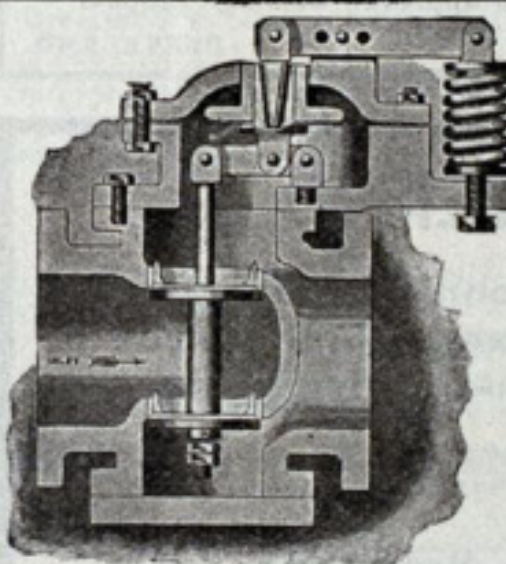
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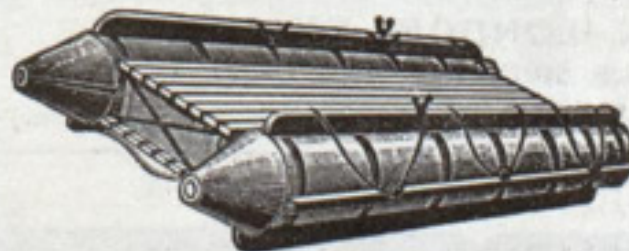
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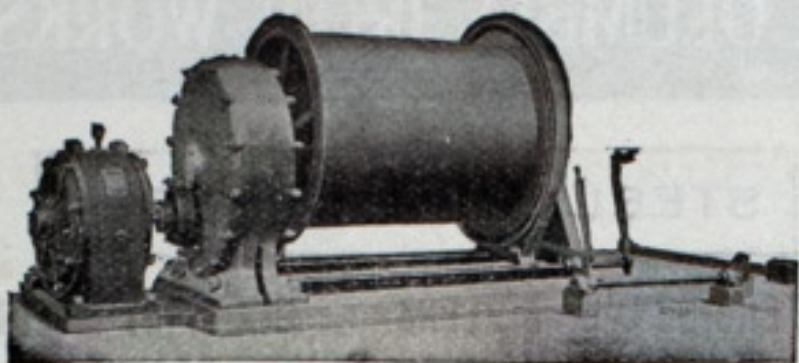
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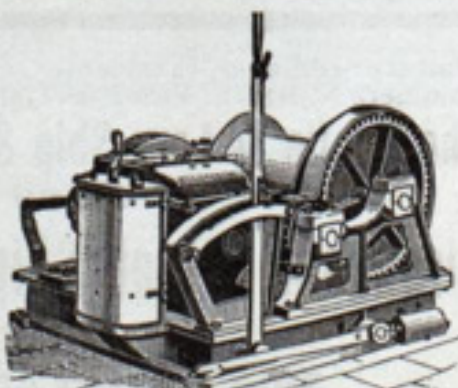
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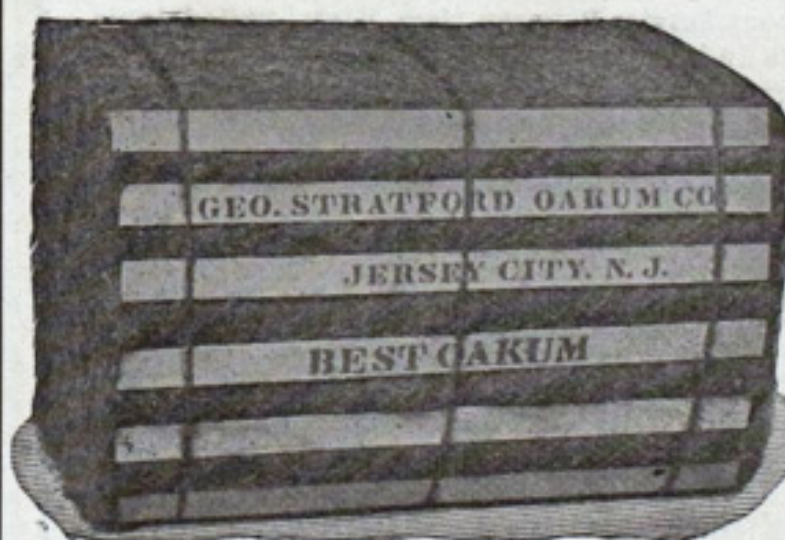
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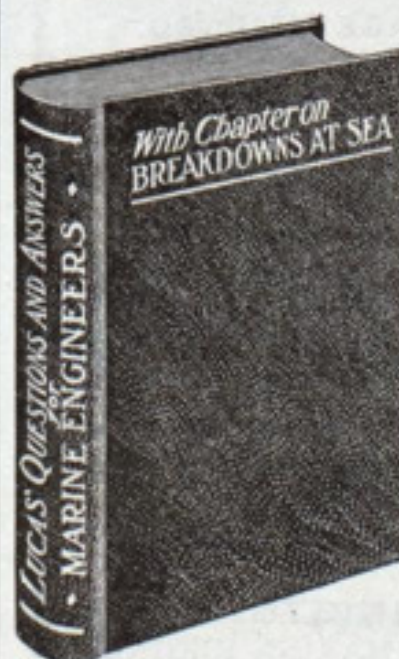
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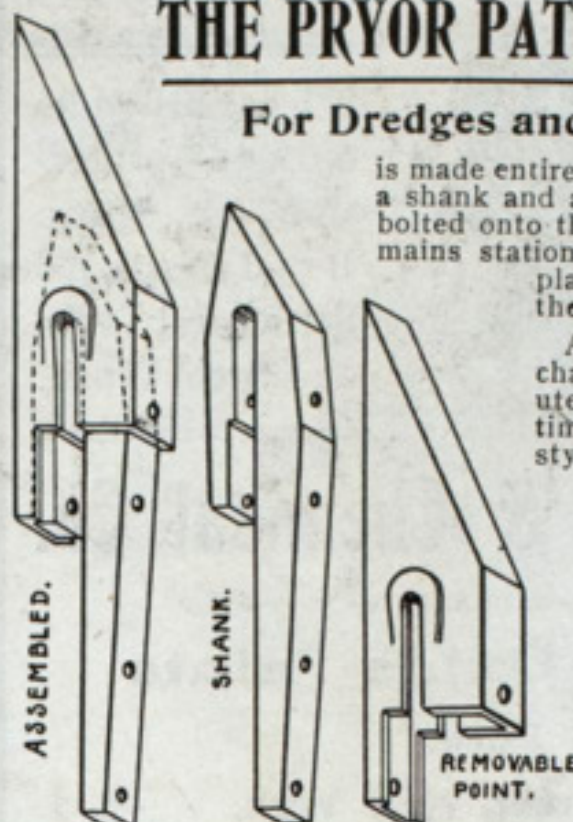
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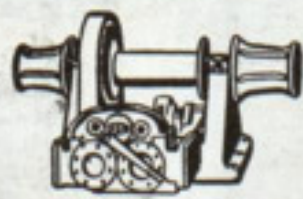


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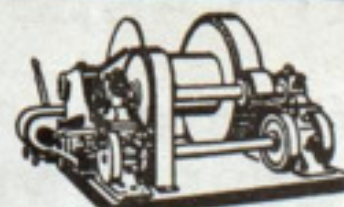
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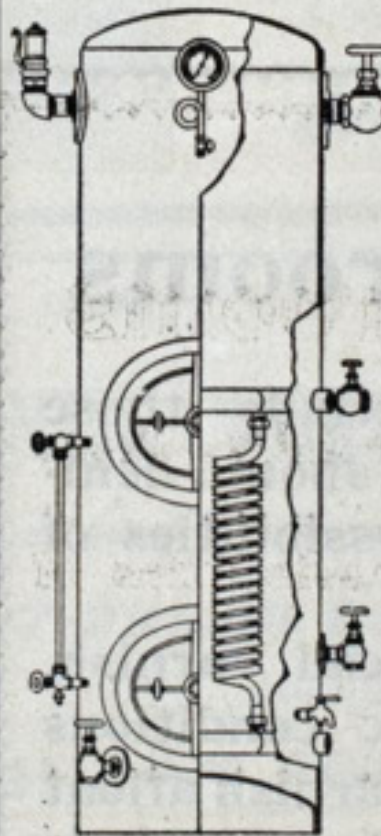
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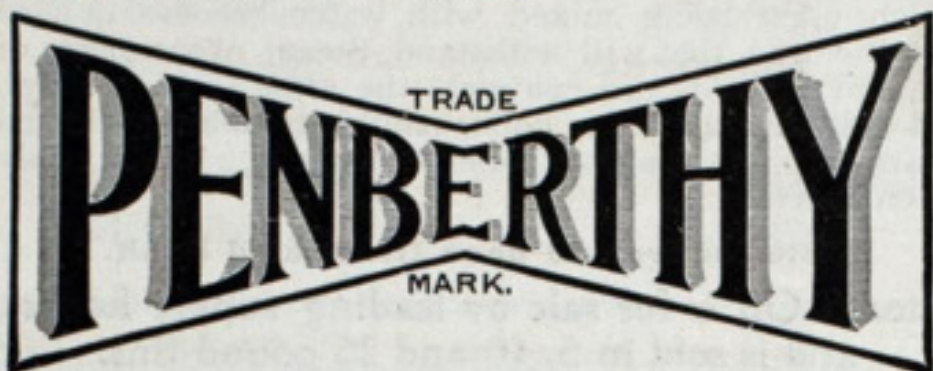


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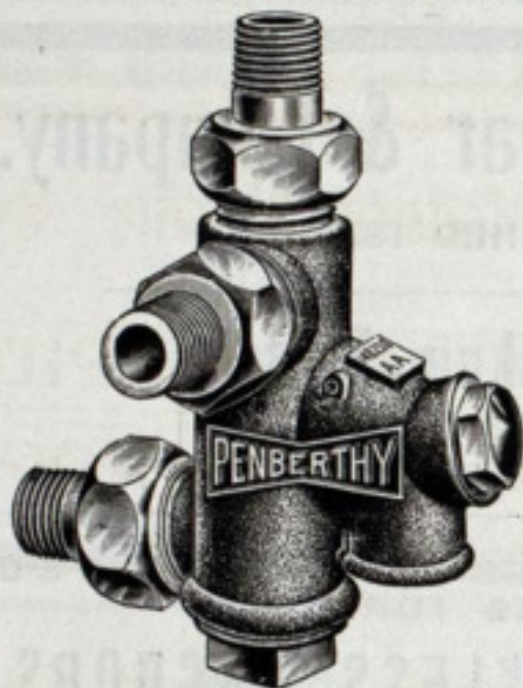
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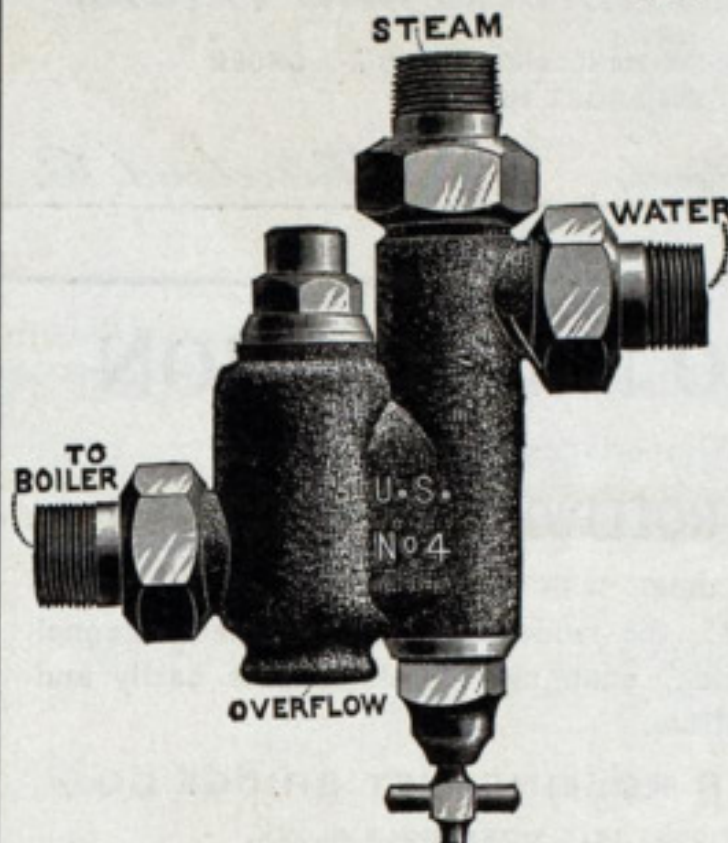
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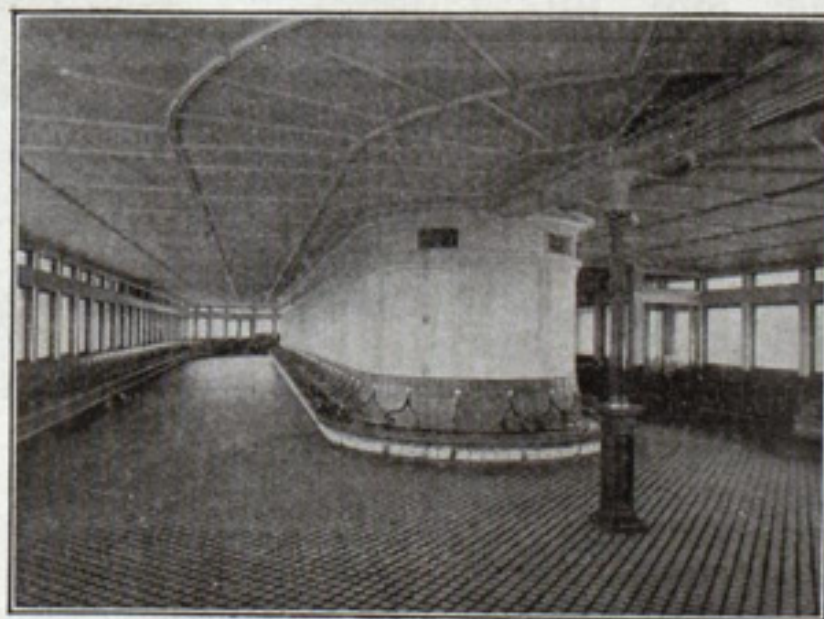
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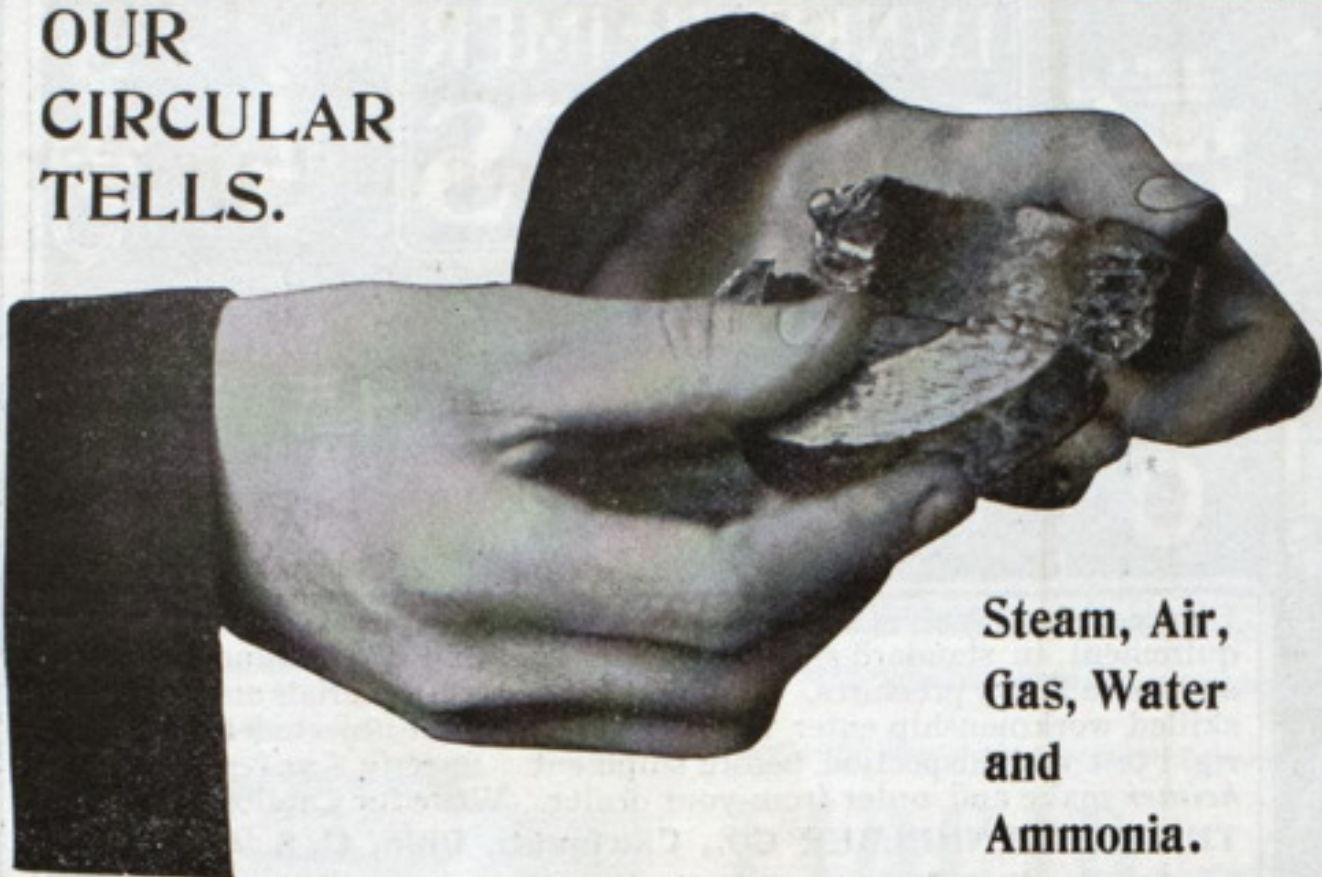
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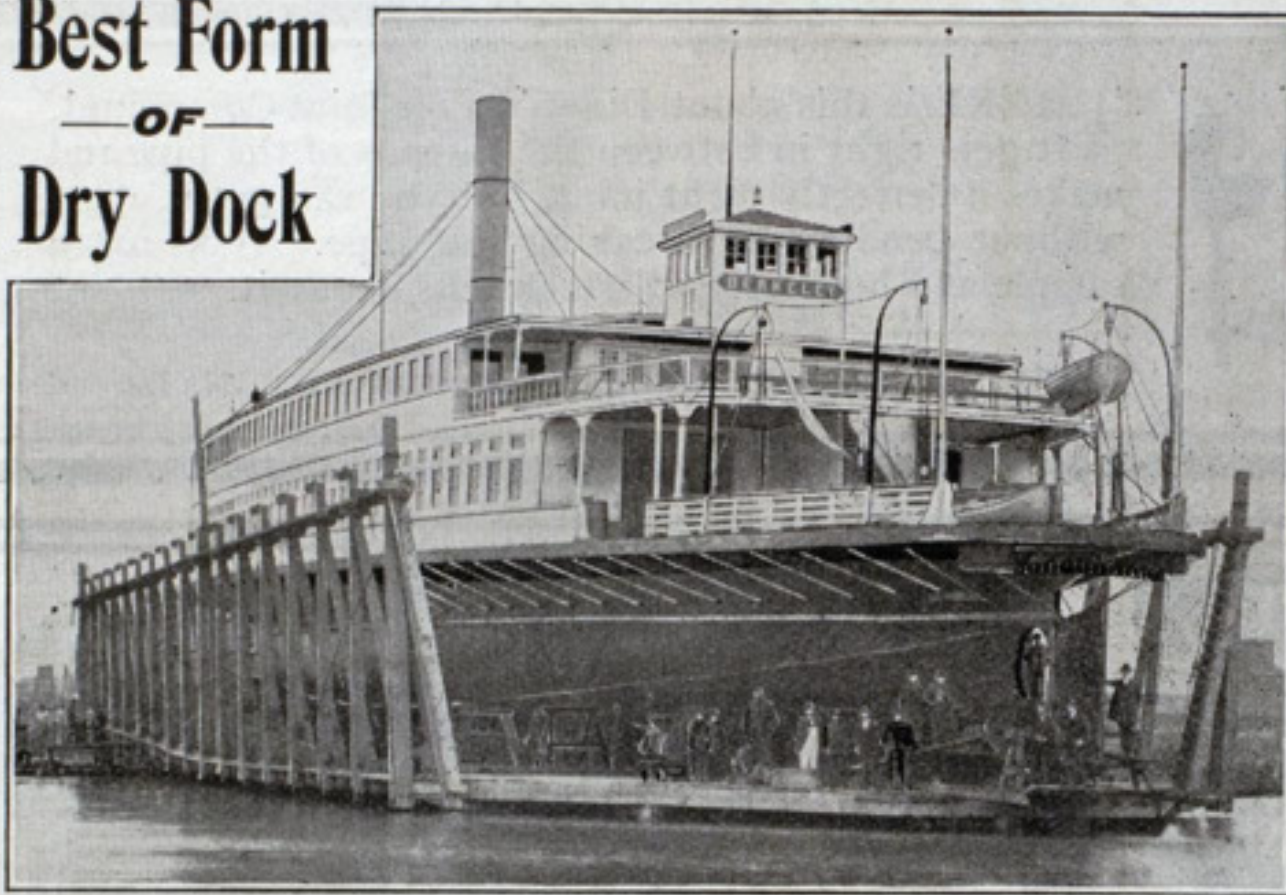
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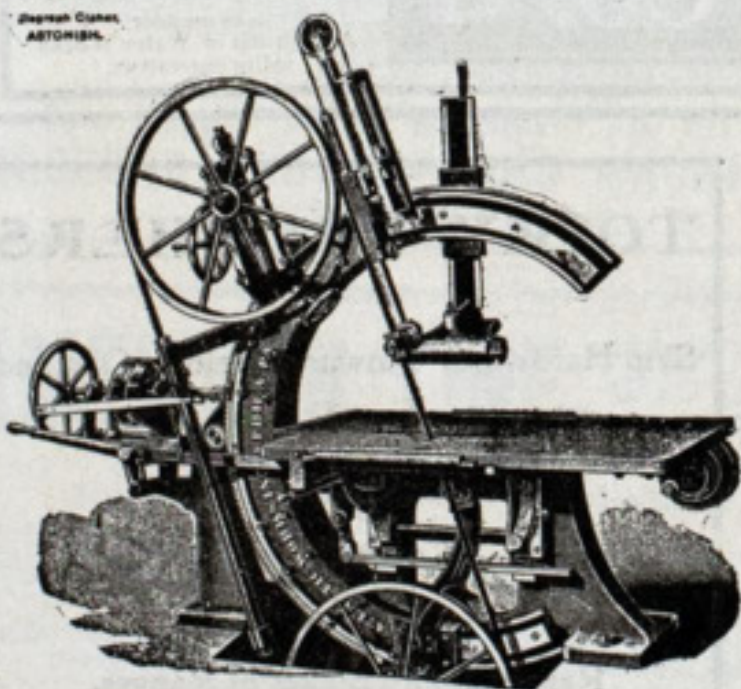
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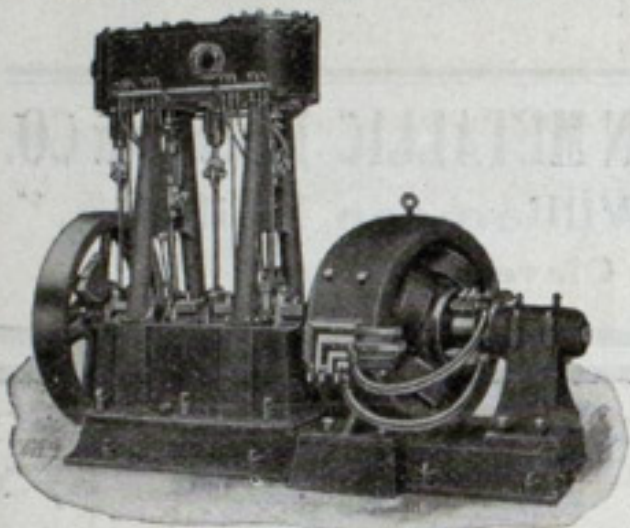
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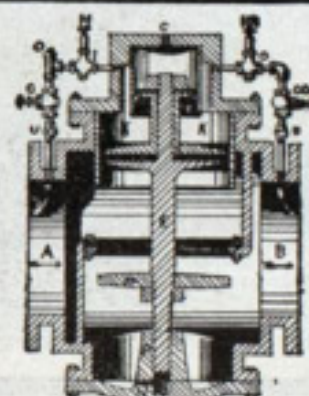
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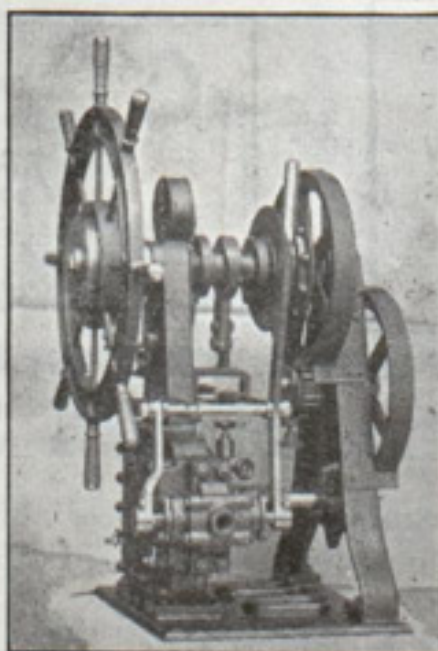


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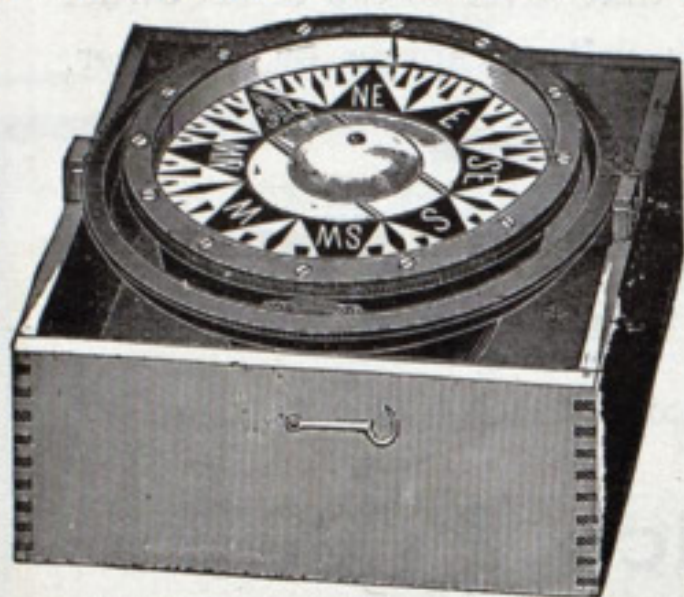
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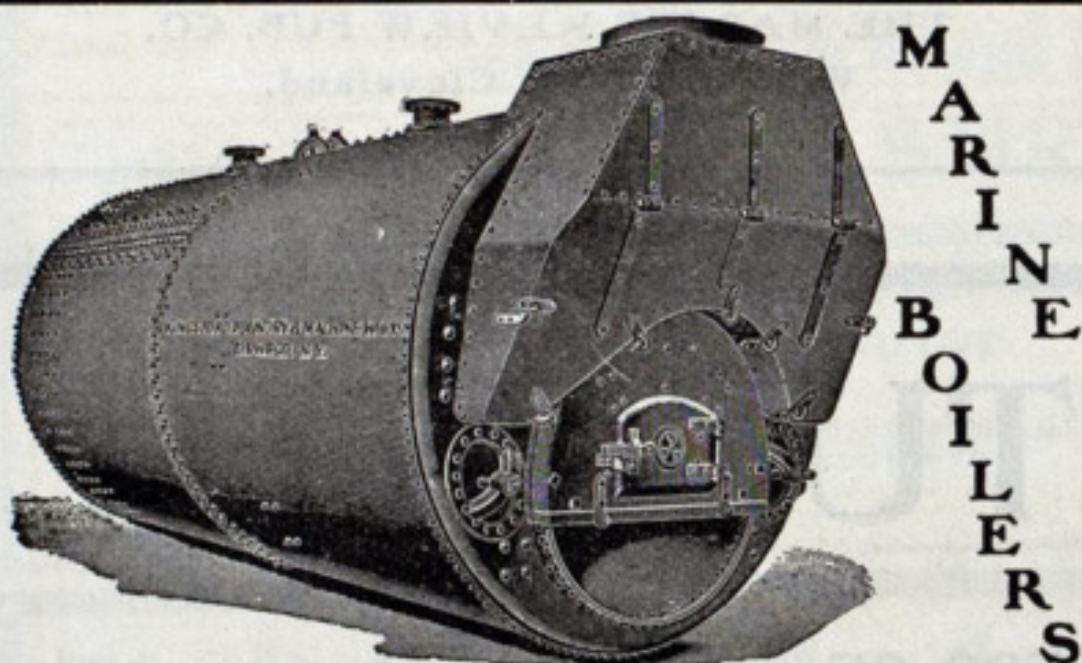


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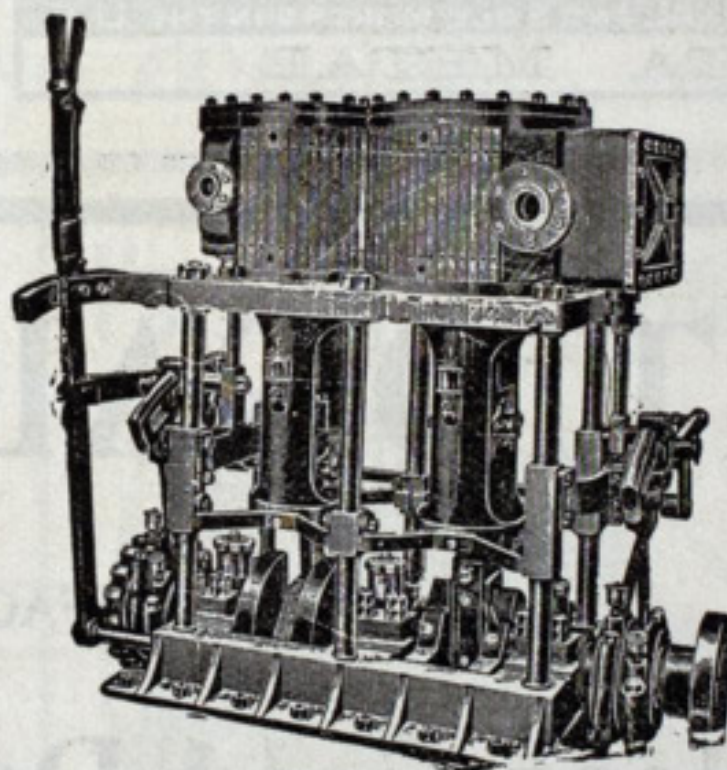
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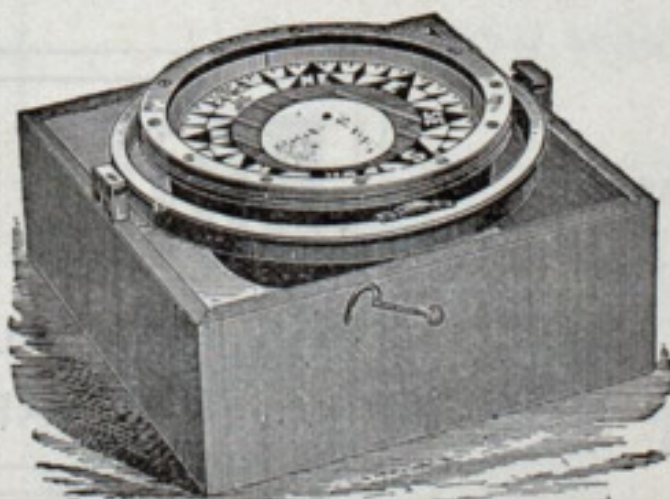
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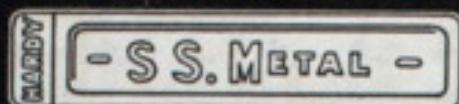
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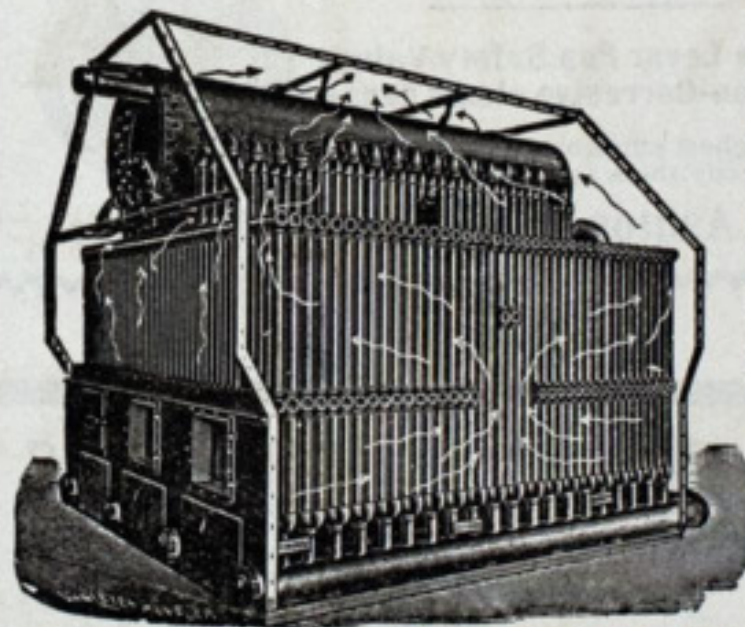
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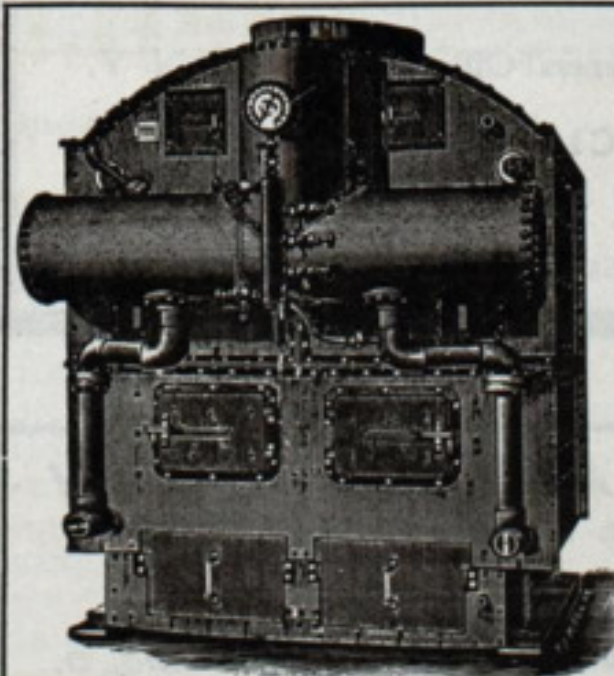
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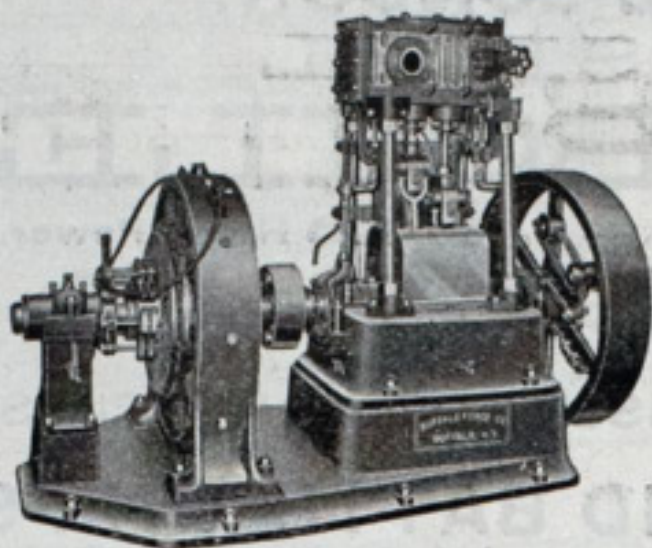


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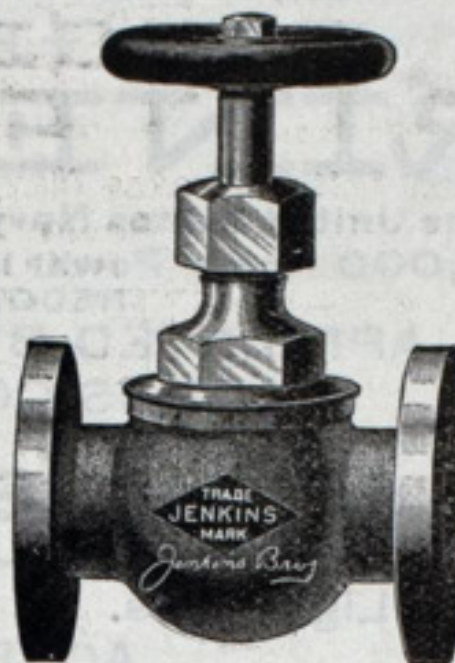
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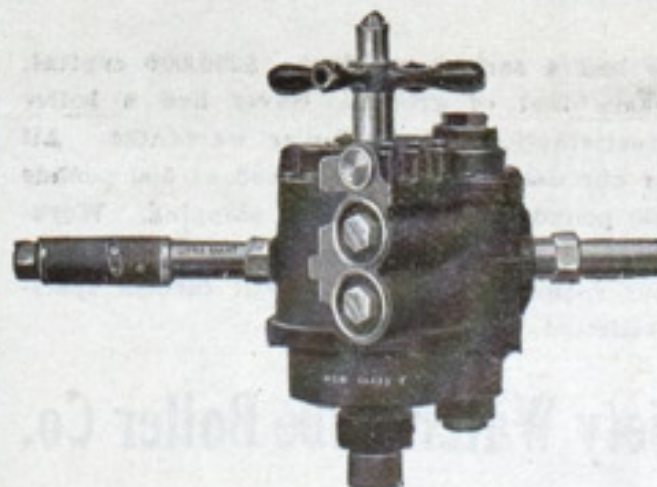
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